



COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DRAFT PERMIT

TO WITHDRAW GROUNDWATER IN THE
EASTERN VIRGINIA GROUNDWATER MANAGEMENT AREA

Permit Number: GW0051901

Effective Date: XXXXXXXX XX, 2023

Expiration Date: XXXXXXXX XX, 2033

Pursuant to the Ground Water Management Act of 1992 (Section 62.1-254 et seq. of the Code of Virginia) and the Groundwater Withdrawal Regulations (Regulations) (9VAC25-610), the Department of Environmental Quality hereby authorizes the Permittee to withdraw and use groundwater in accordance with this permit.

Permittee Isle of Wight County

Facility Sandy Mount Community Water System

Facility Address 201 Pinehurst Drive

Smithfield, VA 23430

The Permittee's authorized groundwater withdrawal shall not exceed:

12,700,000 gallons per year,
1,500,000 gallons per month,

The permitted withdrawal will be used to provide water for a municipal public water supply. Other uses are not authorized by this permit.

The Permittee shall comply with all conditions and requirements of the permit.

By direction of the Department of Environmental Quality, this Permit is granted by:

Signed _____

Scott Morris, DBA, P.E.
Director, Water Division

Date _____

This permit is based on the Permittee's application submitted on March 27, 2018, and subsequently amended to include supplemental information provided by the Permittee. The following are conditions that govern the system set-up and operation, monitoring, reporting, and recordkeeping pertinent to the Regulations.

Part I

Operating Conditions

A. Authorized Withdrawal

1. The withdrawal of groundwater shall be limited to the following wells identified in the table below. Withdrawals from wells not included in Table 1 are not authorized by this permit and are therefore prohibited. 9VAC25-610-140 A

Table 1

Owner Well Name	DEQ Well #	Well Depth (ft bls)	Screen Intervals	Aquifer	Latitude	Longitude	Datum
SM-1	146-00316	610	525-535	Potomac	36° 56' 43.4"	-76° 38' 38.6"	NAD27
SM-2	146-00322	555	525-535	Potomac	36° 56' 43.2"	-76° 38' 38.3"	NAD27

2. Any actions that result in a change to the status, construction, or pump intake setting of wells included in this permit must be pre-approved by the Department of Environmental Quality (Department or DEQ) in writing prior to implementing the change and a revised GW-2 Form must be submitted to the Department within 30 days after the physical construction of a well is altered or the pump intake setting has been changed. If changes are a result of an emergency, notify the Department within 5 days from the change. 9VAC25-610-140 C

B. Public Water Supplies

1. Daily withdrawal limits set forth in this permit are consistent with the requirements and conditions of the Virginia Department of Health (VDH) Waterworks Operation Permit No. 3093580. 9VAC25-610-140 A 5
2. The Permittee shall submit copies of an updated Waterworks Operation Permit and the associated Engineering Description Sheets to the Department within 30 days of receipt from the Virginia Department of Health. 9VAC25-610-140 C

C. Pump Intake Settings

1. The Permittee shall not place a pump or water intake device lower than the top of the uppermost confined aquifer that a well utilizes as a groundwater source or lower than the bottom of an unconfined aquifer that a well utilizes as a groundwater source in order to prevent dewatering of the aquifer, loss of inelastic storage, or damage to the aquifer from compaction. 9VAC25-610-140 A 6
2. Pump settings in individual wells are limited as follows. Any change in the pump setting must receive prior approval by the Department.

Owner Well Name	DEQ Well #	Max Pump Setting (feet below land surface)
SM-1	146-00316	372
SM-2	146-00322	372

D. Reporting

1. Water withdrawn from each well shall be recorded monthly at the end of each month and reported to the Department, in paper or electronic format, on a form provided by the Department by the tenth (10th) day of each January, April, July and October for the respective previous calendar quarter. Records of water use shall be maintained by the Permittee in accordance with Part III.F, 1 through 5 of this permit. 9VAC25-610-140 A 9
2. The Permittee shall report any amount more than the permitted withdrawal limit by the fifth (5th) day of the month following the month when such a withdrawal occurred. Failure to report may result in compliance or enforcement activities. 9VAC25-610-140 C
3. The following is a summary of reporting requirements for specific facility wells:

Owner Well Name	DEQ Well #	Reporting Requirements
SM-1	146-00316	Water Use
SM-2	146-00322	Water Use

E. Water Conservation and Management Plan

1. The Water Conservation and Management Plan (WCMP) submitted in the application received March 27, 2018 and subsequently amended and then approved by the Department is incorporated by reference into this permit and shall have the same effect as any condition contained in this permit and may be enforced as such.
2. By the end of the first year of the permit cycle *[date]* the Permittee shall submit documentation to the Department that the leak detection and repair program defined in the WCMP has been initiated. This documentation shall include activities completed during the first year of the permit term. 9VAC25-610-100 B
3. As soon as completed but not later than the end of the second year of the permit cycle *[date]* the Permittee shall submit to the Department results of an audit of the total amount of groundwater used in the distribution system and operational processes. This documentation shall include any resulting changes to the leak detection and repair program in the WCMP. 9VAC25-610-100 B
4. A report on the plan's effectiveness in reducing water use, including revisions to those elements of the WCMP that can be improved and addition of other elements found to be effective based on operations to date shall be submitted by the end of years four *[date]* and eight *[date]* of the permit term. These reports shall include as appropriate: 9VAC25-610-140 C
 - a. Any new water saving equipment installed or water saving processes adopted;
 - b. WCMP actions taken to reduce the volume of water needed to supply the system;

- c. Planned short or long term efforts and actions to be added to the WCMP to improve the efficiency of water use in the system or by customers and for reducing the loss of water;
 - d. Results of additional water audits completed;
 - e. Review of water use category (residential, commercial, industrial) per-connection use in municipal systems;
 - f. Evaluation of the leak detection and repair program;
 - g. Description of educational activities completed; and
 - h. Identification of any water reuse opportunities identified.
5. If revisions or additions to the plan are necessary, an updated WCMP shall be submitted to the Department for approval along with the report prior to implementation of the revised plan.
 6. Records of activities conducted pursuant to the WCMP are to be submitted to the Department upon request.

F. Well Tags

1. Each well that is included in this permit shall have affixed to the well casing, in a prominent place, a permanent well identification plate that records, at a minimum, the Department well identification number, the groundwater withdrawal permit number, the total depth of the well, and the screened intervals in the well. Such well identification plates shall be in a format specified by the Department and are available from the Department. 9VAC25-610-140 A 12
2. Well tags shall be affixed to the appropriate well casing within 30 days of receiving the tags from the Department. The accompanying well tag installation certification form shall be returned to the Department within 60 days of receipt of the tags. 9VAC25-610-140 C

Part II Special Conditions

Pursuant to 9VAC25-610-140 B and C, the following Special Condition applies to this permit in order to protect the public welfare, safety, and health or conserve, protect and help ensure the beneficial use of groundwater.

A. Monitoring Well Maintenance

Test Well (DEQ Well# 146-00323) shall be secured and protected from vandalism or accidental misuse at all times with a locked cap, or other protective cover. If the Permittee determines that the well is no longer needed, the Permittee shall permanently abandon Test Well (DEQ Well # 146-00323) in accordance with the Virginia Department of Health's Regulations (12VAC5-630-450) and submit documentation to the Department of Environmental Quality within 30 days of abandonment. At least two weeks prior to the scheduled abandonment, the Permittee shall notify the Department of the

scheduled abandonment date.

Part III

General Conditions

A. Duty to Comply

The Permittee shall comply with all conditions of the permit. Nothing in this permit shall be construed to relieve the permit holder of the duty to comply with all applicable federal and state statutes, regulations and prohibitions. Any permit violation is a violation of the law and is grounds for enforcement action, permit termination, revocation, modification, or denial of a permit application. 9VAC25-610-130 A

B. Duty to Cease or Confine Activity

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the activity for which a permit has been granted in order to maintain compliance with the conditions of the permit. 9VAC25-610-130 B

C. Duty to Mitigate

The Permittee shall take all reasonable steps to avoid all adverse impacts that may result from this withdrawal as defined in 9VAC25-610-10 and provide mitigation of the adverse impact when necessary as described in 9VAC25-610-110 D 3 g and 9VAC25-610-130 C.

D. Inspection, Entry, and Information Requests

Upon presentation of credentials, the Permittee shall allow the the Department, or any duly authorized agent of the Department, at reasonable times and under reasonable circumstances, to enter upon the Permittee's property, public or private, and have access to, inspect and copy any records that must be kept as part of the permit conditions, and to inspect any facilities, well(s), water supply system, operations, or practices (including sampling, monitoring and withdrawal) regulated or required under the permit. For the purpose of this section, the time for inspection shall be deemed reasonable during regular business hours. Nothing contained herein shall make an inspection time unreasonable during an emergency. 9VAC25-610-130 D

E. Duty to Provide Information

The Permittee shall furnish to the Department, within a reasonable time, any information that the Department may request to determine whether cause exists for modifying or revoking, reissuing, or terminating the permit, or to determine compliance with the permit. The Permittee shall also furnish to the Department, upon request, copies of records required to be kept by regulation or this permit. 9VAC25-610-130 E

F. Monitoring and Records Requirements

1. The Permittee shall maintain a copy of the permit on-site and/or shall make the permit available

upon request. 9VAC25-610-130 E

2. Monitoring of parameters shall be conducted according to approved analytical methods as specified in the permit. 9VAC25-610-130 F 1
3. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. 9VAC25-610-130 F 2
4. The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart or electronic recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit, for a period of at least three years from the date of the expiration of a granted permit. This period may be extended by request of the Department at any time. 9VAC25-610-130 F 3
5. Records of monitoring information shall include as appropriate: 9VAC25-610-130 F 4
 - a. the date, exact place and time of sampling or measurements;
 - b. the name(s) of the individual(s) who performed the sampling or measurements;
 - c. the date the analyses were performed;
 - d. the name(s) of the individual(s) who performed the analyses;
 - e. the analytical techniques or methods supporting the information, such as observations, readings, calculations and bench data used;
 - f. the results of such analyses; and
 - g. chain of custody documentation.

G. Environmental Laboratory Certification

The Permittee shall comply with the requirement for certification of laboratories conducting any tests, analyses, measurements, or monitoring required pursuant to the State Water Control Law (§ 62.1-44.2 et seq. of the Code of Virginia), Environmental Laboratory Certification Program (§ 2.2-1105 et seq. of the Code of Virginia), Certification for Noncommercial Environmental Laboratories (1VAC30-45), and/or Accreditation for Commercial Environmental Laboratories (1VAC30-46), and

1. Ensure that all samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
2. Conduct monitoring according to procedures approved under 40CFR Part 136 or alternative methods approved by the U.S. Environmental Protection Agency.

3. Periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals that will ensure accuracy of measurements. 1VAC30-45-20

H. Future Permitting Actions

1. A permit may be modified or revoked as set forth in Part VI of the Groundwater Withdrawal Regulations. 9VAC25-610-290 and 9VAC25-610-130 G
2. If a Permittee files a request for permit modification or revocation, or files a notification of planned changes, or anticipated noncompliance, the permit terms and conditions shall remain effective until the Department makes a final case decision. This provision shall not be used to extend the expiration date of the effective permit. 9VAC25-610-130 G
3. Permits may be modified or revoked upon the request of the Permittee, or upon Department initiative, to reflect the requirements of any changes in the statutes or regulations. 9VAC25-610-130 G
4. The Permittee shall schedule a meeting with the Department prior to submitting a new, expanded or modified permit application. 9VAC25-610-85
5. A new permit application shall be submitted 270 days prior to the expiration date of this permit, unless permission for a later date has been granted by the Department, to continue a withdrawal greater than or equal to 300,000 gallons in any month while an application for a renewal is being processed. 9VAC25-610-96
6. A new permit application shall be submitted 270 days prior to any proposed modification to this permit that will (i) result in an increase of withdrawal above permitted limits; or (ii) violate the terms and conditions of this permit. 9VAC25-610-96
7. The applicant shall provide all information described in 9VAC25-610-94 for any reapplication. 9VAC25-610-96 C
8. The Permittee must notify the Department in writing of any changes to owner and facility contact information within 30 days of the change. 9VAC25-610-140 C

I. Metering and Equipment Requirements

1. Each well and/or impoundment or impoundment system shall have an in-line totalizing flow meter to read gallons, cubic feet, or cubic meters installed prior to beginning the permitted use. Meters shall produce volume determinations within plus or minus 10% of actual flows. An alternative method for determining flow may be approved by the Department on a case-by-case basis. 9VAC25-610-140 A
7 b
 - a. A defective meter or other device must be repaired or replaced within 30 days.
 - b. A defective meter is not grounds for not reporting withdrawals. During any period when a meter is defective, generally accepted engineering methods shall be used to estimate

withdrawals. The period during which the meter was defective must be clearly identified in the groundwater withdrawal report required by Part I, Subsection D of this permit.

2. Each well shall be equipped in a manner such that water levels can be measured during pumping and non-pumping periods without dismantling any equipment. Any opening for tape measurement of water levels shall have an inside diameter of at least 0.5 inches and be sealed by a removable plug or cap. The Permittee shall provide a tap for taking raw water samples from each permitted well.

9VAC25-610-140 A 7 e

J. Minor Modifications

1. A minor modification to this permit must be made to replace an existing well(s) or add an additional well(s) provided that the well(s) is screened in the same aquifer(s) as the existing well(s), and is in the near vicinity of the existing well(s), the total groundwater withdrawal does not increase, the area of impact does not increase, and the well has been approved by the Department prior to construction. 9VAC25-610-330 B 4 and B 5
2. A minor modification to this permit must be made to combine withdrawals governed by multiple permits when the systems are physically connected as long as interconnection will not result in additional groundwater withdrawal and the area of impact will not increase. 9VAC25-610-330 B 6
3. Minor modifications to this permit must also be made to:
 - a. Change an interim compliance date up to 120 days from the original compliance date, as long as the change does not interfere with the final compliance date. 9VAC25-610-330 B 7
 - b. Allow for change in ownership when the Department determines no other change in the permit is necessary and the appropriate written agreements are provided in accordance with the transferability of permits and special exceptions. 9VAC25-610-320 and 9VAC25-610-330 B 8
 - c. Revise a Water Conservation and Management Plan to update conservation measures being implemented by the Permittee that increase the amount of groundwater conserved. 9VAC25-610-330 B 9

K. Well Construction

At least two weeks prior to the scheduled construction of any well(s), the Permittee shall notify the Department of the construction timetable and receive prior approval of the well(s) location(s) and acquire the DEQ Well number. All wells shall be constructed in accordance with the following requirements.

1. A well site approval letter or well construction permit must be obtained from the Virginia Department of Health prior to construction of the well. 9VAC25-610-130 A
2. A complete suite of geophysical logs (16"/64" Normal, Single Point, Self-Potential, Lateral, and Natural Gamma) shall be completed for the well and submitted to the Department along with the corresponding completion report. 9VAC25-610-140 C

3. The Permittee shall evaluate the geophysical log and driller's log information to estimate the top of the target aquifer and; therefore, a depth below which the pump shall not be set. The Permittee's determination of the top of the target aquifer shall be submitted to the Department for review and approval, or approved on site by the Department's Groundwater Characterization staff, prior to installation of any pump. 9VAC25-610-140 A 6
4. The Permittee shall install gravel packs and grout in a manner that prevents leakance between aquifers. Gravel pack shall be terminated close to the top of the well screen(s) and shall not extend above the top of the target aquifer. 9VAC25-610-140 C
5. A completed GW-2 Form and any additional water well construction documents shall be submitted to the Department within 30 days of the completion of any well and prior to the initiation of any withdrawal from the well. The assigned Department Well number shall be included on all well documents. 9VAC25-610-140 C
6. In addition to the above requirements, if required by the permit, construction of a Water Level Monitoring State Observation Well (SOW) requires:
 - a. The Permittee shall coordinate activities with the Department's Groundwater Characterization Program (GWCP) to determine the appropriate observation well location and construction schedule, along with the needed screen interval(s), and other completion details following review of geophysical logging. 9VAC25-610-140 C
 - b. Prior to preparation of bid documents for construction of the observation well, the Permittee shall notify the Department and shall include any GWCP requirements in the bid documents. At a minimum, the Department will require a pre-bid meeting with interested drilling contractors and a pre-construction meeting with the successful bidder. 9VAC25-610-140 C
 - c. Instrumentation to meet the requirements for real-time data transmission consistent with the State Observation Well Network shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct the installation of the transducer and final hook-up of the equipment. 9VAC25-610-140 C
7. In addition to the above requirements, if required by the permit, construction of a Chloride Monitoring SOW requires:
 - a. The Permittee shall coordinate activities with the Department's Groundwater Characterization Program (GWCP) to determine the appropriate observation well location and construction schedule, along with the needed screen interval(s), and other completion details following review of geophysical logging. 9VAC25-610-140 C
 - b. Prior to preparation of bid documents for construction of the observation well, the Permittee shall notify the Department and shall include any GWCP requirements in the bid documents. At a minimum, the Department will require a pre-bid meeting with interested drilling contractors and a pre-construction meeting with the successful bidder. 9VAC25-610-140 C

- c. Instrumentation to meet the requirements for real-time data transmission consistent with the State Observation Well Network shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct final hook-up of the equipment. 9VAC25-610-140 C
- d. Instrumentation to meet the requirements for continuous measurement of specific conductance from multiple levels within the well screen shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct the final hook-up of the equipment. 9VAC25-610-140 C

L. Permit Reopening

This permit may be reopened for the purpose of modifying the conditions of the permit as follows:

1. To meet new regulatory standards duly adopted by the Board. 9VAC25-610-140 A 11
2. When new information becomes available about the permitted withdrawal, or the impact of the withdrawal, which had not been available at permit issuance and would have justified the application of different conditions at the time of issuance. 9VAC25-610-310 B 1
3. When the reported withdrawal is less than 60% of the permitted withdrawal amount for a five year period. 9VAC25-610-310 B 2
4. If monitoring information indicates the potential for adverse impacts to groundwater quality or level due to this withdrawal. 9VAC25-610-140 C

COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

PERMIT ISSUANCE FACT SHEET

Groundwater Withdrawal Permit Number: GW0051901

Application Date: March 19, 2018

The Department of Environmental Quality (Department or DEQ) has reviewed the application for a Groundwater Withdrawal Permit. This document provides the pertinent information concerning the legal basis, scientific rationale, and justification for the issuance/reissuance/modification of the Groundwater Withdrawal Permit listed below. Based on the information provided in the application and subsequent revisions, the Department has determined that there is a reasonable assurance that the activity authorized by the permit is a beneficial use as defined by the regulations. Groundwater impacts have been minimized to the maximum extent practicable. The following details the application review process and summarizes relevant information for developing the Permit and applicable conditions.

Permittee / Legal Responsible Party

Name & Address: Isle of Wight County
13048 Poor House Road, P.O. Box 108
Isle of Wight, VA 23397
Phone: (757) 365-1650

Facility Name and Address

Name & Address: Sandy Mount Community Water System
201 Pinehurst Drive
Smithfield, VA 23430
Phone: (757) 365-1650

Contact Information:

Name: Don Jennings
E-mail: djennings@isleofwightus.net
Phone: (757) 365-1655 (office); (757)604-3155(cell)

Proposed Beneficial Use Type: The permitted withdrawal will be used to provide water for a municipal public water supply.

Staff Findings and Recommendations

Based on review of the permit application, staff provides the following findings.

- The proposed activity is consistent with the provisions of the Ground Water Management Act of 1992, and will protect other beneficial uses.
- The proposed permit addresses minimization of the amount of groundwater needed to provide the intended beneficial use.
- The effect of the impact will not cause or contribute to significant impairment of state waters.
- The permit reflects the required consultation with and full consideration of the written recommendations of the Virginia Department of Health (VDH).

Staff recommends Groundwater Withdrawal Permit Number GW0051901 be issued as proposed.

Approved: _____

Scott Morris, DBA, P.E.
Director, Water Division

Date: _____

Processing Dates

Processing Action	Date Occurred/Received
Pre-Application Meeting:	August 9, 2017
Application Received by DEQ:	March 27, 2018
Permit Fee Deposited by Accounting:	March 29, 2018
Application Review Conducted:	November 9, 2018
Notice of Deficiency Sent	NA
Request for Additional Information Sent:	NA
Local Government Ordinance Form Received by DEQ:	March 27, 2018
Application Complete:	April 7, 2021
Submit Request for Technical Evaluation:	April 26, 2021
Technical Evaluation Received by DEQ:	April 30, 2021
Draft Permit Package Sent:	February 28, 2023
Submit Draft Permit for Public Notice:	
Public Notice Published:	
End of 30-Day Public Comment Period:	
Response to Public comment:	
Public Meeting or Hearing:	

Application

Application Information**Description:****Background / Purpose of Facility:**

The system was constructed in the 1970's with the two original wells, Old Well #1 and Smithfield Heights #1, installed in 1971 and 1973. The two current production wells are SM-1 (DEQ Well # 146-00316) and SM-2 (DEQ Well # 146-00322). The system was initially permitted under GW0033000 for 11,700,000 gallons per year (gal/yr). Groundwater Withdrawal Permit GW0051900 was issued in 2008 for 16,242,500 gal/yr and 1,937,500 gallons per month (gal/mo) to account for 25 homes being added to the system. The previous permit (GW0051900) expired May 31, 2018 and was administratively continued pursuant to 9VAC25-610-96. The system supplies the Sandy Mount Community including Smithfield Heights with mostly residential connections and a few businesses.

Location of Facility/Withdrawal:

Water Supply Planning Unit: Hampton Roads PDC

County: Isle of Wight

GWMA/Aquifer: Eastern Virginia GWMA / Potomac aquifer

Conjunctive Use Source: No conjunctive use.

Withdrawal Use, Current Need, and Projected Demand:

Basis of Need:

The system supplies the Sandy Mount Community including Smithfield Heights and was serving 191 connections, at the time of application. The connections are mostly residential with a few businesses making up about 5% of the withdrawal. The community is located on the north side of Scotts Factory Road (Route 620) at Pinehurst Drive, approximately two miles east of the intersection of Routes 620 and US258 and about 3 miles southeast of the Town of Smithfield.

Water Demand and Projections:

The applicant evaluated the past water use from 2008 through 2017 and found the highest annual water use of 12,060,000 gal in 2008. The highest monthly amount during this period was 1,406,000 gal in July 2008. These values were used as the amount required to supply the current system connections. For the 191 connections at the time of application, this equates to 63,145 gallons per year per connection (gal/yr/c) and 7,360 gallons per month per connection (gal/mo/c). This equates to 173 gallons per day per connection (gal/day/c) annually and 237.5 gal/day/c as a monthly high.

The applicant anticipated the 9 remaining lots being added to the water system over the ten-year permit term and thus, included the 9 lots in future demand projections. Based on 200 connections (191 + 9 new) at 63,145 gal/yr/c, an annual amount of 12,629,000 gal/yr was determined along with a monthly amount of 1,472,500 gal based on the 7,360 gal/mo level for 200 connections. This request represents about a 21% decrease from the 2008 permitted amounts of 16,242,500 gal/yr and 1,937,500 gal/mo.

Withdrawal Volumes Requested: The applicant requested the following withdrawal volumes based upon the projected groundwater demand.

Period of Withdrawal	Total Volume (gal)	Volume in gal/day
Maximum Monthly:	1,472,000	47,484
Maximum Annual:	12,629,000	34,600

Department Evaluation

Historic Withdrawals:

From 2008 through 2017 the highest annual water use of 12,060,000 gal in 2008 and the highest monthly usage was 1,406,000 gal in July 2008. The withdrawal has gradually decreased since 2008 and has been in the mid 8,000,000 gal/yr range since 2018.

Analysis of Alternative Water Supplies:

The nearest larger system that could potentially supply the Sandy Mount system is the Town of Smithfield approximately 3 miles away, which is also supplied by groundwater. The nearest surrounding development, the Newport Development Service District in Isle of Wight County, is contracted to be provided with 1,000,000 gallons per day (gal/day) of treated water from the City of Suffolk; however, the Sandy Mount Community is not part of this district. There are no nearby surface water bodies with

sufficient flow to support the community water supply needs. The cost of installing extensive water lines or treatment for this small community are currently prohibitive.

Public Water Supply:

The water system operates under VDH WWOP #3093580 with an effective date of June 30, 1995, and the associated Engineering Description Sheet (EDS) with an effective date of June 2, 2009. The permitted design capacity on the updated EDS is 80,000 gal/day with source capacity stated to be the limiting factor.

Water Supply Plan Review:

Water use for the system was included in the regional Water Supply Plan (WSP) with an approximate 30,000 gal/day average which aligns well with the requested amount. No alternative water supplies were noted in the WSP for consideration.

Department Recommended Withdrawal Limits:

The requested amount represents a significant reduction from the previously permitted amount and indicates conservative use of the resource.

The Department recommends the following withdrawal volumes based upon evaluation of the groundwater withdrawal permit application. The values are rounded from the requested amount in accordance with the Department's rounding policy.

Period of Withdrawal	Total Volume (gal)	Volume in gal/day
Maximum Monthly:	1,500,000	48,387
Maximum Annual:	12,700,000	34,795

Technical Evaluation:

Aquaveo, LLC performed a technical evaluation of the application for the Department based on the VAHydro Groundwater Eastern Virginia Model (VAHydro-GW-VCPM). The objectives of this evaluation were to determine the areas of any aquifers that will experience at least one foot of water level decline due to the proposed withdrawal (the Area of Impact or AOI), to determine the potential for the proposed withdrawal to cause saltwater intrusion, and to determine if the proposed withdrawal meets the 80% drawdown criteria. Aquaveo, LLC also evaluated water levels in the Eastern Virginia Model compared to measured field values.

The Department concluded that the proposed withdrawal satisfies the technical evaluation criteria for permit issuance. A summary of the results of the evaluation and the AOI for the Potomac Aquifer is provided in the Technical Evaluation (Attachment 1).

Part I
Operating Conditions

Authorized Withdrawals:

Owner Well Name	DEQ Well #	Aquifer	Type	Pump Intake Limit (ft/bls)
SM-1	146-00316	Potomac	Production	372
SM-2	146-00322	Potomac	Production	372

Apportionment:

Although the withdrawal percentage from each well varies month to month, the wells are used fairly evenly and a 50/50 apportionment was requested. The two wells withdrawal from the same aquifer, are close together, and the requested withdrawal did not produce an AOI that extended beyond the property boundary. Given this situation, no apportionment limits were necessary.

Additional Wells:Abandoned Wells:

Owner Well Name/ DEQ Well Number	DEQ Well #	Aquifer
Smithfield Heights 1 (SH-1)	146-00233	Potomac
Smithfield Heights 2 (SH-2)	146-00282	Potomac
Old Well #1	146-00149	Potomac

Out of Service Wells:

Owner Well Name/ DEQ Well Number	DEQ Well #	Aquifer
Test Well	146-00323	Potomac

Observation Wells: There are no observation wells associated with the system.

Pump Intake Settings:

Department staff reviewed available information and made the following determinations regarding the location of the aquifer tops for the following well. Information reviewed in this process included GW-2 forms for the system wells, driller's logs, the geophysical log for SM-1 (DEQ Well # 146-00316) and The Virginia Coastal Plain Hydrogeologic Framework (USGS Professional Paper 1731).

Unit	Well SM-1 (ft/bls)
Yorktown-Eastover	*-170
Piney Point	255-270
Aquia	317-369
Potomac	372-1380 (bottom estimated)

*Insufficient information to determine Yorktown-Eastover aquifer top

Given the close proximity of the two wells, the aquifer top and pump intake limit for Well SM-2 was extrapolated from Well SM-1. Both well pumps are correctly positioned in accordance with 9VAC25-610-140 A 6 at 302 and 326 feet below land surface (ft/bls) for Well SM-1 and SM-2 respectively.

Withdrawal Reporting:

Groundwater withdrawals are to be recorded monthly and reported quarterly.

Water Conservation and Management Plan:

A Water Conservation and Management Plan (WCMP) meeting the requirements of 9VAC25-610-100 B was submitted and reviewed as part of the application process. The accepted Plan is to be followed by the permittee as an operational Plan for the facility/water system, is incorporated by reference into this permit, and shall have the same effect as any condition contained in this permit and may be enforced as such (Attachment 2). In addition, the Permit includes conditions requiring the following:

- Documentation that the leak detection and repair program defined in the WCMP has been initiated is due by the end of the first year of the permit term.
- A result of an audit of the total amount of groundwater used in the distribution system and operational processes is due by the end of the second year of the permit term.
- A report on the plan's effectiveness in reducing water use, including revisions to those elements of the WCMP that can be improved and addition of other elements found to be effective based on operations to date shall be submitted by the end of years four [date] and eight [date] of the permit term.

Mitigation Plan: The predicted AOI resulting from the Technical Evaluation does not extend beyond the service area boundaries. A Mitigation Plan was therefore not required for the permit.

Well Tags: Well tags will be transmitted by the Department after issuance of the final permit.

Part II
Special Conditions

With the exception of condition listed below, review of the applicant's application, well construction data, operations at the facility, and the Technical Evaluation of the application did not identify a need for water quality or water level monitoring or pump intake reset conditions in the permit. There are no new wells currently planned for construction during the permit term. Technical Evaluation of the application was based on model parameters and aquifer testing is not required at this time. Construction of observation

wells or well nests, and geophysical boreholes to assist in monitoring or characterizing the local or regional aquifer system are not required at this time.

Monitoring Well Maintenance:

The Permittee must continue to properly maintain Test Well (DEQ Well# 146-00323) as a monitoring well and the well must be secured and protected from vandalism or accidental use at all times with a locking cap or other secure cover. If the Permittee determines that the well is no longer needed, the Permittee shall permanently abandon Test Well (DEQ Well # 146-00323) in accordance with the Virginia Department of Health's Regulations (12VAC5-630-450) and submit documentation to the Department of Environmental Quality within 30 days of abandonment. At least two weeks prior to the scheduled abandonment, the Permittee shall notify the Department of the scheduled abandonment date.

Part III
General Conditions

General Conditions are applied to all Groundwater Withdrawal Permits, as stated in the Groundwater Withdrawal Regulations, 9VAC25-610.

Public Comment

The following sections will be completed after close of the public comment period.

Relevant Regulatory Agency Comments:

Summary of VDH Comments and Actions:

Public Involvement during Application Process:

Local and Area wide Planning Requirements: The Isle of Wight County Administrator certified on March 19, 2018, that the facility's operations are consistent with all ordinances. The Department received this certification on March 27, 2018.

Public Comment/Meetings:

The public notice was published in xxxxxx on XXX. The public comment period ran from xxxxx to xxxxx

Changes in Permit Part II Due to Public Comments**Changes in Permit Part III Due to Public Comments**

Attachments

- 1. Technical Evaluation**
- 2. Water Conservation and Management Plan**
- 3. Public Comment Sheet (*if warranted*)**

**COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY**

TECHNICAL EVALUATION FOR PROPOSED GROUNDWATER WITHDRAWAL

Date: April 26, 2021

Application /Permit Number: GW0051901

Owner / Applicant Name: Isle of Wight County

Facility / System Name: Sandy Mount Community Water System

Facility Type: Municipal Public Water Supply

Facility / System Location: 201 Pinehurst Drive, Smithfield, VA 23430

The Commonwealth of Virginia's Groundwater Withdrawal Regulations (9VAC25-610) provide that, for a permit to be issued for a new withdrawal, to expand an existing withdrawal, or reapply for a current withdrawal, a technical evaluation shall be conducted. This report documents the results of the technical evaluation conducted to meet the requirements for the issuance of a permit to withdraw groundwater within a Designated Groundwater Management Area (9VAC25-600).

This evaluation determines the:

- (1) The Area of Impact (AOI): The AOI for an aquifer is the areal extent of each aquifer where one foot or more of drawdown is predicted to occur as a result of the proposed withdrawal.
- (2) Water Quality: The potential for the proposed withdrawal to cause salt water intrusion into any portion of any aquifers or the movement of waters of lower quality into areas where such movement would result in adverse impacts on existing groundwater users or the groundwater resource
- (3) The Eighty Percent Drawdown (80% Drawdown): The proposed withdrawal in combination with all existing lawful withdrawals will not lower water levels, in any confined aquifer that the withdrawal impacts, below a point that represents 80% of the distance between the land surface and the top of the aquifer at the points where the one-foot drawdown contour is predicted for the proposed withdrawal.

Requested withdrawal amount:

Requested Withdrawal Amount	
Ten (10) Year Value	Not Applicable
Annual Value	12,700,000 (34,795 average gpd)
Monthly Value	1,500,000 (50,000 average gpd)

Requested Apportionment of Withdrawal:

The requested apportionment is a 50/50 allocation for the two wells.

Summary of Requested Withdrawal:

The system supplies the Sandy Mount Community serving 191 connections, at the time of application. The connections are primarily residential with a few businesses comprising approximately 5% of the total water withdrawal. The current production wells were installed in 2005 to replace the previous wells serving the interconnected Sandy Mount and Smithfield Heights communities due to exceedance of Primary Maximum contaminant Levels for fluoride.

Production Well(s):

Identification	Location	Construction	Pump Intake	Source Aquifer
Owner Well Name: SM-1 DEQ Well Number: 146-00316 MPID: 365643076383901	Lat: 36° 56' 43.4" Lon: -76° 38' 38.6" (datum NAD 1927) Elevation 55 ft-msl	Completion Date: 6/22/2005 Screens (ft/bls): 525-535 Total Depth (ft/bls): 610	302 ft/bls	Potomac
Owner Well Name: SM-2 DEQ Well Number: 146-00322 MPID: 365643076383801	Lat: 36° 56' 43.2" Lon: -76° 38' 38.3" (datum NAD 1927) Elevation 55 ft-msl	Completion Date: 5/18/2005 Screens (ft/bls): 525-535 Total Depth (ft/bls): 555	326 ft/bls (or 278 ft/bls per the VDH Permit)	Potomac

Out of Service Wells:

Identification	Location	Construction	Pump Intake	Source Aquifer
Owner Well Name: Test Well DEQ Well Number: 146-00323 MPID: 36564376383800	Lat: 36° 56' 43.5" Lon: -76° 38' 38.4" (datum NAD 1927) Elevation unknown	Completion Date: 2/25/04 Screens (ft/bls): 534- 544 Total Depth (ft/bls): 544	NA	Potomac

Abandoned Wells:

Identification	Location	Construction	Pump Intake	Source Aquifer
Owner Well Name: Smithfield Heights 1 (SH-1) (In Well House) DEQ Well Number: 146-00233 MPID: 365648076385901	Lat: 36° 56' 48.0" Lon: -76° 38' 59.0" (datum NAD 1927) Elevation 70 ft-msl	Completion Date: 3/1/1973 ABN: 12/9/2008 Screens (ft/bls): 475-495 Total Depth (ft/bls): 495	NA	Potomac

Owner Well Name: Smithfield Heights 2 (SH-2) DEQ Well Number: 146-00282 MPID: 365635076390001	Lat: 36° 56' 48.02" Lon: -76° 38' 59.0" (datum NAD 1927) Elevation 75 ft-msl	Completion Date: 8/19/1988 ABN: 12/9/2008 Screens (ft-bls): 380-400 Total Depth (ft-bls): 400	NA	Potomac
Owner Well Name: Old Well #1 DEQ Well Number: 146-00149 MPID: 365645076390001	Lat: 36° 56' 43.5" Lon: -76° 38' 38.6" (datum NAD 1927) Elevation 65 ft-msl	Completion Date: 6/11/1971 ABN: 8/2/2005 Screens (ft/bls): 474-494 Total Depth (ft/bls): 494	NA	Potomac

Observation Wells: There are no observation wells associated with this system.

Geologic Setting:

The Sandy Mount Community Water System wells (applicant wells) are located in Isle of Wight County. The applicant's production wells are screened in the Potomac aquifer. USGS Professional Paper 1731¹, *The Virginia Coastal Plain Hydrogeologic Framework* (VCPHF), is the most recent study discussing the aquifers and confining units of the Virginia Coastal Plain. The study utilized numerous boreholes throughout the Virginia Coastal Plain to interpolate the elevations of the different hydrogeologic units found in the Coastal Plain.

The Potomac aquifer is the "largest, deepest, and most heavily used source of ground water in the Virginia Coastal Plain." The aquifer is underlain across its entire extent with basement bedrock. The aquifer is found below the Potomac confining zone. The aquifer is primarily composed "of fluvial-deltaic coarse-grained quartz and feldspar sands and gravels and interbedded clays." The nearest east-west geologic cross section, FD-FD', from the USGS Professional Paper 1731 is shown in the figure at the end of this report.

Hydrologic Framework:

Data from the VCPHF is reported in this technical report to illustrate the hydrogeologic characteristics of the aquifers in the Virginia Coastal Plain near the applicant well and identify major discrepancies between regional hydrogeology and site logs interpreted by the DEQ staff geologist. The Virginia Coastal Plain Model² (VCPM) framework was constructed by extracting the hydrogeologic unit tops and thicknesses from the VCPHF. The original USGS VCPM was updated and adapted for use in the VA-DEQ well permitting process and is referred to as VAHydroGW-VCPM.

¹ McFarland E. R., and Bruce T.S., 2006. The Virginia Coastal Plain Hydrologic Framework: U.S. Geologic Survey Professional Paper 1731. 118 p., 25 pls. (available online at <http://pubs.water.usgs.gov/pp1731/>).

² Heywood, C.E., and Pope, J.P., 2009, Simulation of groundwater flow in the Coastal Plain aquifer system of Virginia: U.S. Geological Survey Scientific Investigations Report 2009-5039, 115 p.

VAHydroGW-VCPM Model:

The following table lists the locations of the applicant production wells within the VAHydroGW-VCPM Model.

VAHydroGW-VCPM Model Grid				
Well	Well Number	MPID	Row	Column
SM-1	146-00316	365643076383901	101	49
SM-2	146-00322	365643076383801	101	49

The following aquifer top elevations and thicknesses are simulated in the VAHydroGW-VCPM Model at the model cell containing the applicant wells.

VAHydroGW-VCPM Model Hydrogeologic Unit Information		
Aquifer	Elevation (ft-msl)	Depth (ft-bls)
Surface	62	0
Water Table aquifer (bottom)	38	24
Yorktown-Eastover (top)	38	24
Yorktown-Eastover (bottom)	-113	175
Piney Point (top)	-193	255
Piney Point (bottom)	-215	277
Aquia (top)	-254	316
Aquia (bottom)	-280	342
Potomac (top)	-295	357
Potomac (bottom)	-1320	1382

Note: ft-msl = feet mean sea level

Groundwater Characterization Program Recommendations:

DEQ staff reviewed available information and made the following determinations regarding the location of the aquifer tops for the following well. Information reviewed in this process included GW-2 forms for the system wells, driller's logs, the geophysical log for SM-1, Well # 146-00316 and The Virginia Coastal Plain Hydrogeologic Framework (USGS Professional Paper 1731).

Unit	Well SM-1 (ft/bls)
Yorktown-Eastover	?*-170
Piney Point	255-270
Aquia	317-369
Potomac	372-1380 (bottom estimated)

*Insufficient information to determine Yorktown-Eastover aquifer top

Comparison of the Hydrogeologic Framework and Geologist Report:

The VCPMF identifies the top and thickness of the Potomac aquifer at an elevation of 357 ft-bls and 1,025 feet thick at the cell containing the applicant wells. The top elevation and thickness of the Potomac aquifer given by DEQ staff of 372 ft-bls and 1,008 ft are in general agreement with the VCPMF.

Pump Intake Elevation:

Virginia regulations specify that well pump intakes must be placed at or above the top of the source aquifer. Based on a review of available site information the pump intake elevations are in compliance with the limits specified by regulation³.

Water Level Comparison:

The *Virginia Coastal Plain Model (VAHydroGW-VCPM) 2019-2020 Annual Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use* report and modeling files⁴ provide two sets of simulated potentiometric water surface elevations. These water elevations are based upon, 1) the reported withdrawal amount of wells in the VAHydroGW-VCPM model ("the reported use simulation") and, 2) the total permitted withdrawal amount for wells in the VAHydroGW-VCPM model ("the total permitted simulation"). USGS regional observation network well water levels were compared to the water levels in the 2020 report in order to evaluate the performance of the regional model in the vicinity of the applicant wells and assess historical groundwater trends. In the tables below, simulated water levels from the year 2019, from the reported use simulation, were compared to USGS measured water levels for the same year. For comparison, the total permitted simulated water levels are also reported. The total permitted water levels are taken from the end of the 50 year total permitted simulation and represent simulated water levels, 50 years from present, if all GWMA wells were to pump at their total permitted amount.

The USGS regional observation network wells closest to the applicant wells are shown in Figure 1 and listed in the following tables. The depth of these wells corresponds with the Potomac aquifer. The distances from the applicant wells to the USGS wells are also given in the tables. The VAHydroGW-VCPM row and column containing the USGS wells are also given. The water levels obtained from the regional observation network wells are shown in Figures 2 and 3. These figures also show the water levels from the reported use VAHydroGW-VCPM simulation for the cell containing each USGS well. The 2019 annual average water levels observed in the regional observation network wells are given in the following tables.

The water level graph for the first well in the Potomac aquifer (57D 21 SOW 143A) shows a steady decline in water levels from the time of the earliest available records (1980) to about 2006. Water levels from 2006 to about 2010 show the water levels stabilizing. The water level then steadily increases from around 2010 to the present. The VAHydroGW-VCPM simulated reported use water levels are a few feet below USGS observed water levels, but are in general agreement.

The water level graph for the second well in the Potomac aquifer (58C 58 SOW 141B) also shows a steady decline in water levels from the time of earliest available records (1980) until about 2006. Water levels from 2006 to the present show a steady increase until the last several years at which time the water levels have been stabilizing. VAHydroGW-VCPM simulated reported use water levels are in general agreement with the USGS observed water levels at this location.

³ 9 VAC 25 610 140.A.5. "The permittee shall not place a pump or water intake device lower than the top of the uppermost confined aquifer that a well utilizes as a ground water source or lower than the bottom of an unconfined aquifer that a well utilizes as a ground water source;

⁴ Refer to "Virginia Coastal Plain Model (VAHydroGW-VCPM) 2019-2020 Annual Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use" at

<http://www.deq.virginia.gov/Programs/Water/WaterSupplyWaterQuantity/GroundwaterCharacterization/ReportsPublications.aspx>

Potomac Aquifer		
Measurement	Well 57D 21 SOW 143A	Well 58C 58 SOW 141B
Distance from nearest applicant well (miles)	4.7	6.7
Elevation (ft-msl)	73	52
VAHydroGW-VCPM Row	100	107
VAHydroGW-VCPM Column	45	52
VAHydroGW-VCPM Cell Elevation	79	18
USGS Regional Well 2019 Average Water Level (ft-bls)	142.1	133.5
USGS Regional Well 2019 Average Water Level (ft-msl)	-69.1	-81.5
VAHydroGW-VCPM 2019 Reported Use Simulated Water Level (ft-bls)	152.2	96.4
VAHydroGW-VCPM 2019 Reported Use Simulated Water Level (ft-msl)	-73.2	-78.4
VAHydroGW-VCPM Total Permitted Simulated Water Level (ft-bls)	182.5	127.9
VAHydroGW-VCPM Total Permitted Simulated Water Level (ft-msl)	-103.5	-109.9

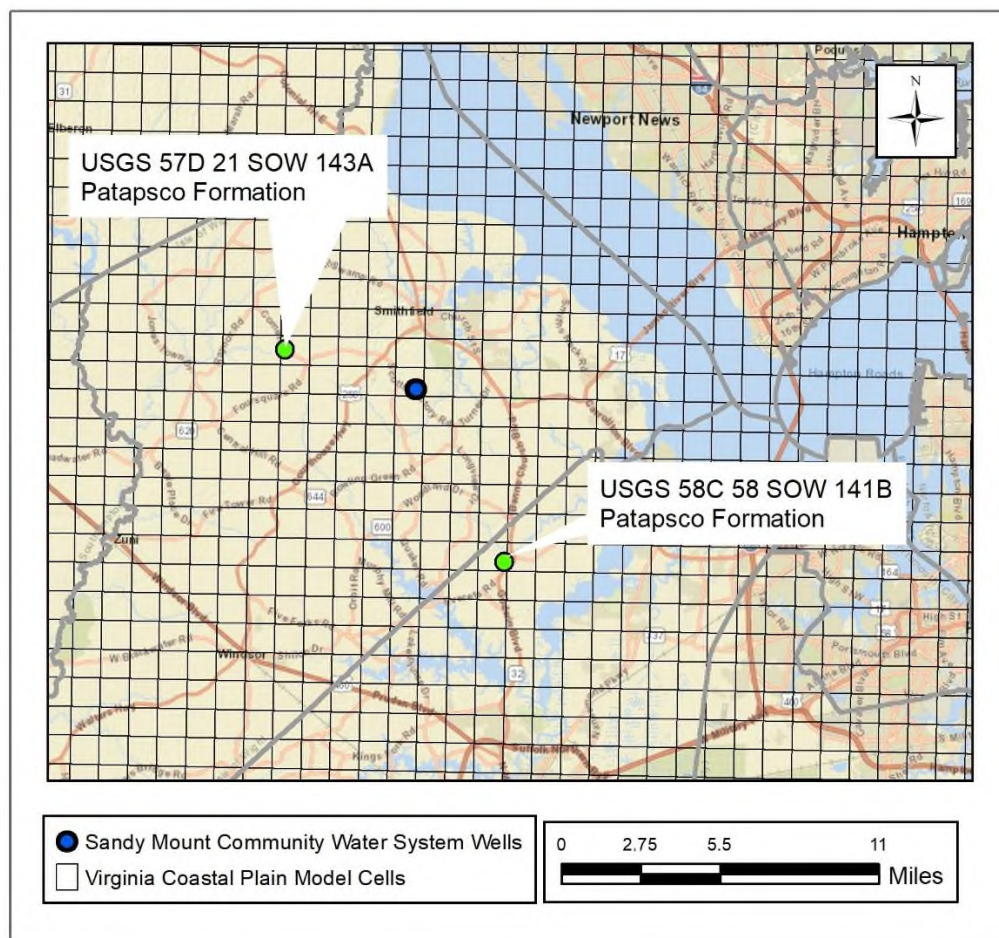


Figure 1. Nearest USGS regional observation network wells.

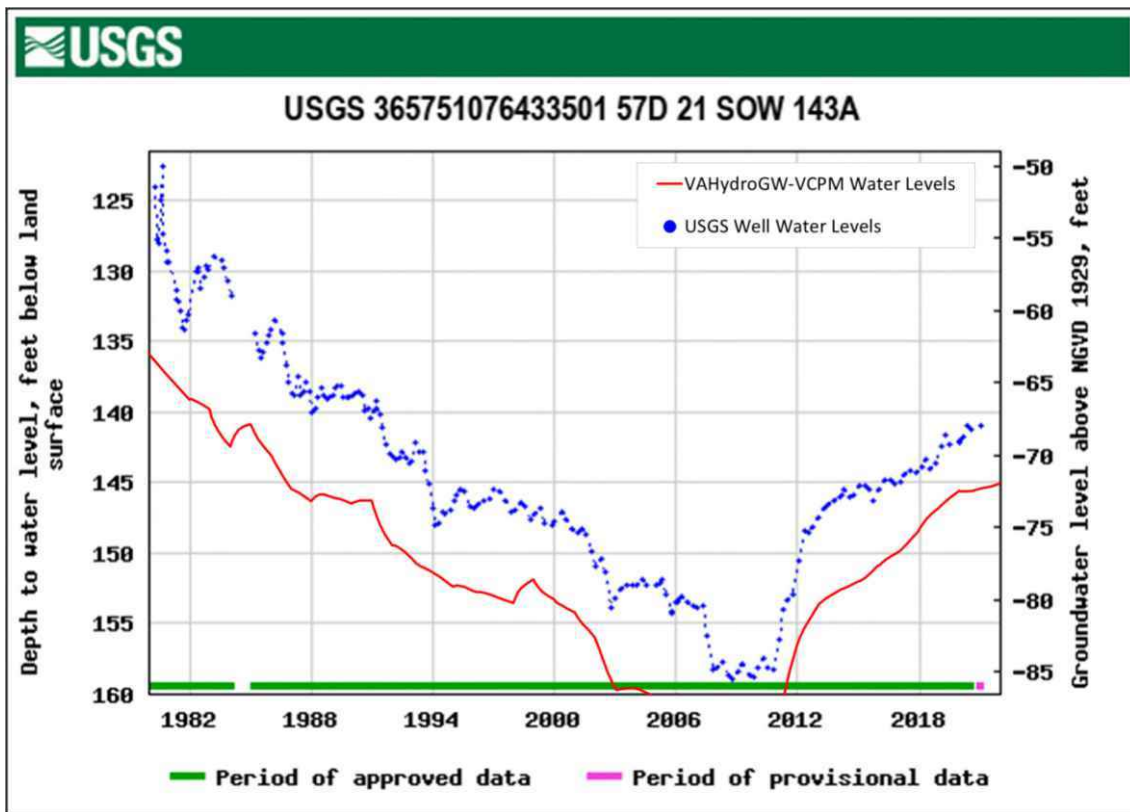


Figure 2. USGS Regional Observation Well 57D 21 SOW 143A, Potomac aquifer water levels (Patapsco Formation) recorded from 1980 to present (well depth 650 ft bls, land surface 73 ft msl) and VAHydroGW-VCPM reported use water levels.

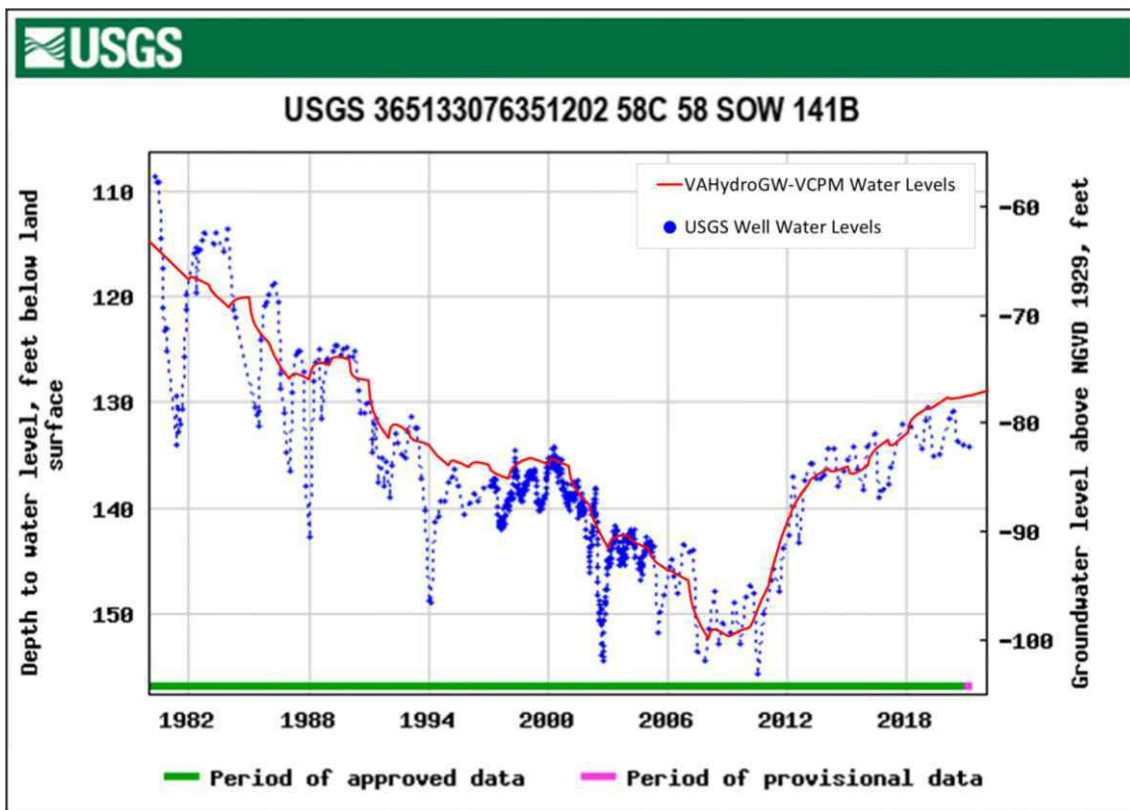


Figure 3. USGS Regional Observation Well 58C 58 SOW 141B, Potomac aquifer water levels (Patapsco Formation) recorded from 1980 to present (well depth 605 ft bls, land surface 52 ft msl) and VAHydroGW-VCPM reported use water levels.

Aquifer Test(s):

A 48-hour constant rate aquifer test was conducted in the Middle Potomac aquifer at Sandy Mount Manor beginning on August 16, 2005. DEQ staff found that the Hantush, 1964 solution⁵ was the best analytical solution for evaluating the aquifer test data. This solution assumes constant discharge from a partial penetrating well in a leaky aquifer. The wells are screened in the top 10 feet of the Middle Potomac aquifer. According to DEQ aquifer picks, the Middle Potomac aquifer could be up to 465 ft thick at this location, indicating that the partial penetration of the wells likely impacts the observed drawdown curve. The data also indicates leakage, making the Hantush, 1964 solution an appropriate tool for analysis. Matching the data to the Hantush, 1964 curve provided the following aquifer properties:

Transmissivity = 12,097 ft²/day

Storage Coefficient = 0.0296 (dimensionless)

r/B = 0.033 (dimensionless)

The hydraulic properties for the VAHydroGW-VCPM cell containing the applicant wells are shown in the following table.

Hydrogeologic Unit	Horizontal Conductivity (ft/day)	Transmissivity (ft ² /day)	Storage Coefficient	Specific Storage (1/ft)
Surficial (Columbia) aquifer	2	48	-	0.000032
Yorktown-Eastover aquifer	22.4	3,378.2	0.00486	0.000032
Piney Point aquifer	18.8	412.5	0.00071	0.000032
Aquia aquifer	109	2,834	0.00084	0.000032
Potomac aquifer	78.5	80,439.0	0.00191	0.00000186

Model Results

Evaluation of Withdrawal Impacts:

Due to the relatively small requested withdrawal rate, the properties from the previous technical evaluation completed in 2008 were used to simulate the drawdown caused by the proposed withdrawal using a 2-dimensional analytical simulation for this technical evaluation. The impacts of the proposed withdrawal were calculated using the Hantush and Jacob (1955) 2-dimensional analytical solution for leaky aquifers. Drawdown values for the source aquifer were calculated using the following parameters, which were obtained from the 2008 TE completed for the facility.

The requested apportionment of withdrawal was for a 50/50 allocation for the two wells. To simulate the impacts of this request and to allow for maximum flexibility in the operation of the wells, the entire requested withdrawal was simulated separately at each well and the resulting areas of impacts were used.

The aquifer parameters used for the 2D analytical simulations for this technical evaluation are listed below:

Model Input Parameters (source: Technical Evaluation of Sandy Mount Community Water System, Isle of Wight County, February 12, 2008):

Potomac Transmissivity, T = 2,382 ft²/day

Potomac Storage Coefficient, S = 0.00705

Inverse Leakage Factor, 1/B = 0.00794 ft⁻¹

⁵ Hantush, M.S., 1964, *Hydraulics of Wells*, Advances in Hydroscience (V.T. Chow, editor), Vol. 1, pp. 281-432, Academic Press, New York.

Withdrawal rate/Simulation Time = 50 years at 12,700,000 gallons per year (34,795 gallons per day)

Area of Impact:

The AOI for an aquifer is the areal extent of each aquifer where one foot or more of drawdown is predicted to occur as a result of the proposed withdrawal. The Hantush-Jacob analytical simulation was executed as described above and simulated a Potomac AOI that extends approximately 6 feet from the applicant wells. A map showing the Potomac AOI is included at the end of this report.

Water Quality:

The regional model (VAHydroGW-VCPM) does not indicate any changes to regional flow patterns that would lead to reduced water quality.

80 % Drawdown:

The 80% criterion was evaluated using the VAHydroGW-VCPM and the Hantush-Jacob analytical simulation. A base simulation was developed to predict the impacts from all existing permits (except the applicant well) operating at their maximum withdrawal. The base simulation used the 2020 Total Permitted pumping rates and 2019 simulated Reported Use water levels as starting conditions. The base simulation was executed for 50 years. A second simulation was conducted using the 2D analytical simulation to simulate drawdown resulting from the applicant well using the parameters and withdrawal rate listed above in the *Model Input Parameters* section of this report. For the baseline simulation, the VAHydroGW-VCPM cell containing applicant wells (row 101/column 49) was simulated to have a potentiometric surface of -89.7 ft-msl for the Potomac aquifer. The 2D analytical simulation simulated a maximum drawdown of 1.9 feet for the Potomac aquifer.

Subtracting the maximum drawdown simulated in the analytical simulation from the simulated water levels in the baseline VAHydroGW-VCPM simulation at the cell nodes resulted in a simulated water level of -91.6 ft-msl for the Potomac aquifer. This approach for simulating the potentiometric surface elevation is the most conservative for the resource. The top elevation of the Potomac aquifer at VAHydroGW-VCPM row 101/column 49 is -295 ft-msl.

The 80% drawdown requirement allows the potentiometric surface (based on the critical surface elevation calculated from the VAHydroGW-VCPM data) to be reduced to -223.6 ft-msl in the Potomac aquifer at the cell node nearest the applicant wells. Therefore, the water level in the source aquifer is not simulated to fall below the critical surface.

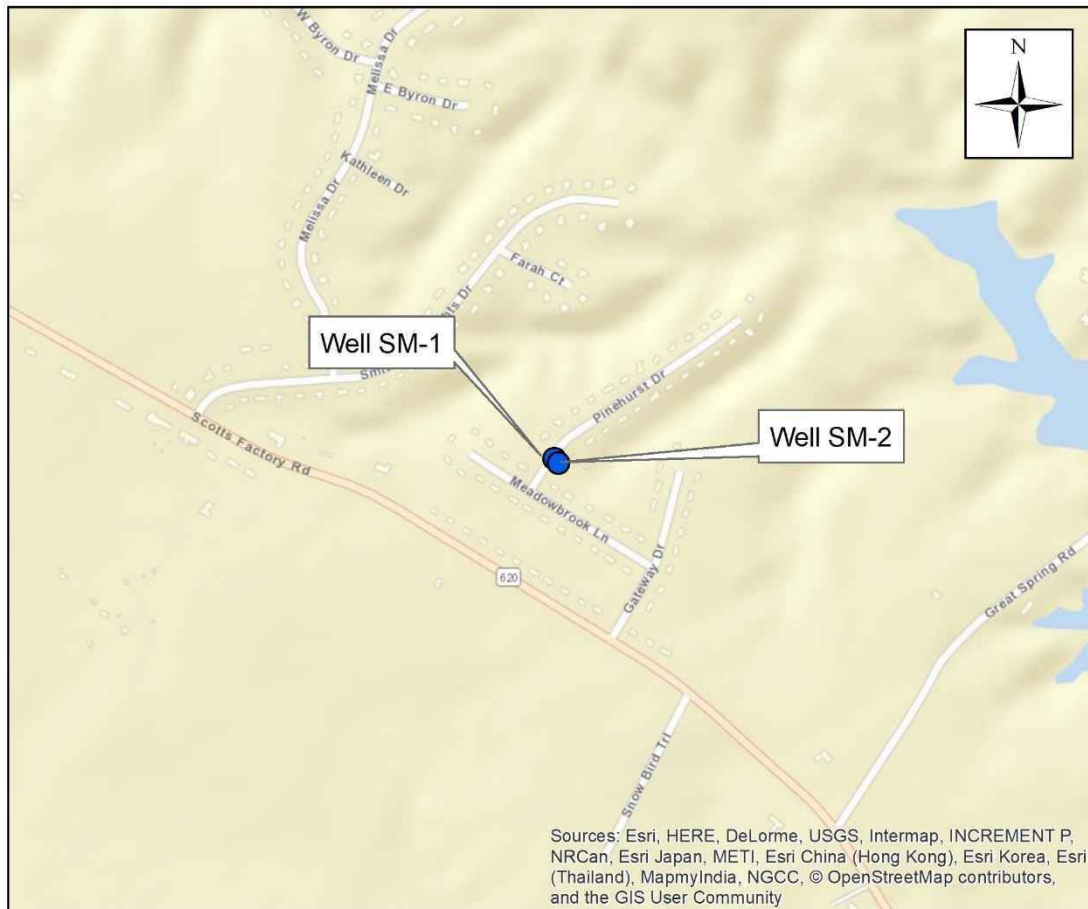
Additionally, the Potomac aquifer AOI does not contain or intersect any VAHydroGW-VCPM cells simulated to have potentiometric water levels below the 80% drawdown requirement. Therefore, this withdrawal is within the limits set by the 80% drawdown criterion.

The requested withdrawal is allocated to the Potomac aquifer. The technical evaluation analysis indicated that the apportionment of the requested withdrawal amount among the applicant production wells had no significant effect on the outcome of the technical evaluation.

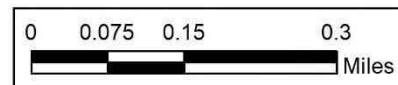
Conclusion:

The withdrawal requested by Isle of Wight County for Sandy Mount Community Water System satisfies the technical evaluation criteria for permit issuance. There are no existing permitted wells within the applicant's AOI.

Sandy Mount Community Water System Area of Impact - Potomac Aquifer



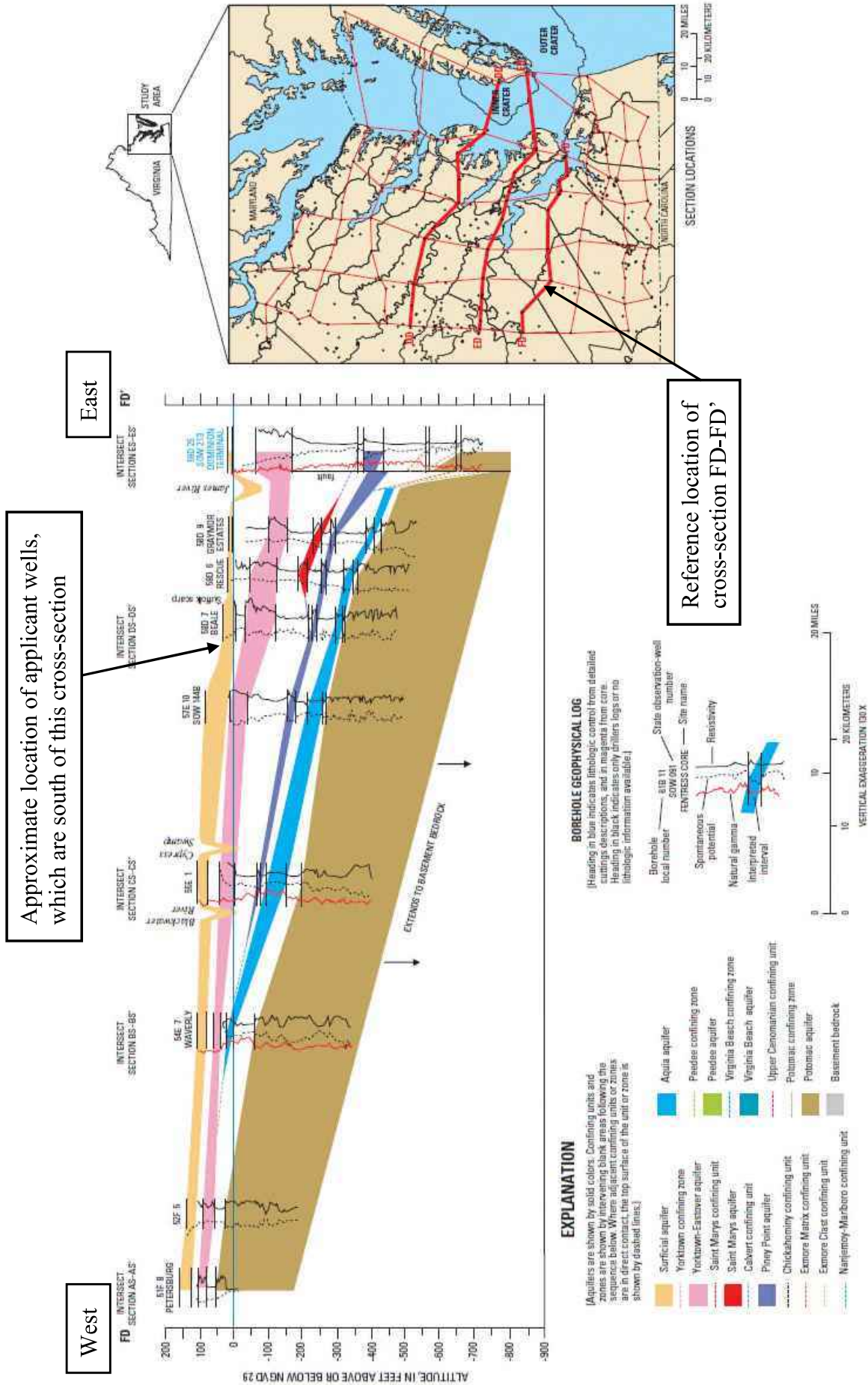
- Sandy Mount CWS Wells
- Potomac AOI



Simulated drawdown at or exceeding one foot in the Potomac aquifer resulting from a 2-dimensional Hantush-Jacob (1955) simulation of 50 years. Pumping was simulated separately at 12,700,000 gallons per year from the Potomac aquifer to allow for maximum flexibility in operations. Maximum radius of one-foot drawdown (Area of Impact) occurs 6 feet from the pumping center.

Technical Evaluation performed by
Aquaveo, LLC for the Virginia DEQ,
Office of Water Supply Planning
April 30, 2021





Coastal Plain (2006) Cross Section FD-FD' from USGS Professional Paper 1731.

**DEPARTMENT OF UTILITY SERVICES
ISLE OF WIGHT COUNTY, VIRGINIA**

**WATER CONSERVATION
AND MANAGEMENT PLAN
ISLE OF WIGHT COUNTY, VIRGINIA**

MARCH 2018

**WATER CONSERVATION AND MANAGEMENT PLAN
ISLE OF WIGHT COUNTY, VIRGINIA**

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WATER CONSERVATION AND MANAGEMENT PLAN ISLE OF WIGHT COUNTY, VIRGINIA

INTRODUCTION

Need for Conservation

Water conservation involves both an increase in efficiency of water use and a reduction of water losses. The net result is a decrease in demand for treated water that can defer development of new resources and reduce the cost of future water service. Each gallon of water conserved is one less requiring storage, treatment and distribution. It may also represent one less gallon that has to be heated for washing or bathing, thus saving energy costs, or that must pass through a wastewater conveyance system and treatment before it is returned to the environment.

Conservation is an important complement to new supply sources. In some cases, conservation may eliminate the need for new sources of supply. Fresh water, like other natural resources, is a limited commodity that must be managed wisely to preserve the well being of future generations. Efforts to conserve existing supplies and efficient allocation of water resources are important during each stage of the water supply planning process.

The Isle of Wight County Department of Utility Services recognizes the need to conserve and effectively manage its water resources. Only by optimizing water use efficiency and reducing water loss can the County satisfy its projected water demands over the next five to ten years. While the search for additional long-term supplies must continue, every effort should be made to efficiently utilize currently available supplies.

Regulatory Requirements

The Groundwater Management Act of 1992 (House Bill 488) was approved in April 1992. It requires a Groundwater Withdrawal Permit (GWP) for certain groundwater withdrawals within declared Groundwater Management Areas (GMAs). Groundwater Withdrawal Regulation 9 VAC 25-610-10 et. seq. requires that applications for new GWPs within GMAs include a water conservation plan approved by the Virginia Department of Environmental Quality, Division of Water (DOW). An approved conservation program must include:

- Use of water-saving plumbing and processes including, where appropriate, the use of water-saving fixtures in new and renovated plumbing as provided under the Uniform Statewide Building Code (USBC).
- A water loss reduction program.
- A water use education program.
- An evaluation of potential water reuse options.

- Requirements for mandatory use reductions during water shortage emergencies declared by the local governing body or the Director of DEQ, including, where appropriate, ordinances prohibiting the waste of water generally and requirements for mandatory water use restrictions, with penalties during water shortage emergencies.

Plan Objectives

The primary objectives of this Water Conservation and Management Plan (the Plan) are to provide a documented, effective conservation strategy designed to reduce demand within Isle of Wight County, and to demonstrate compliance with the Groundwater Management Act of 1992. This Plan will provide methods by which water use efficiency can be increased, as well as procedures to guide the County and its customers through water supply emergencies. Updates of this Plan are anticipated periodically and the Virginia Department of Environmental Quality (VDEQ) will be copied with all updates.

Section 2.0 of this plan describes the use of water-saving plumbing and processes within the service area. Water loss reduction, economic incentives, water use education, and water reuse are discussed in Sections 3.0 through 6.0. The final section of this report describes the Use Restrictions Plan for Isle of Wight County.

WATER-SAVING PLUMBING AND PROCESSES

Uniform Statewide Building Code (USBC)

The Building Officials and Code Administrators (BOCA) organization is a nonprofit organization which develops a series of performance-oriented model codes (BOCA, 1990). These codes were adopted by the Commonwealth of Virginia as part of the Uniform Statewide Building Code (USBC) (DHCD, 1987). These codes directly specify the use of water conservation fixtures in commercial and residential applications.

The USBC applies to all new construction and some remodeling of existing structures. The USBC requires that:

When reconstruction, renovation, or repair of existing buildings is undertaken, existing materials and equipment may be replaced with materials and equipment of similar kind or replaced with greater capacity equipment in the same location when not considered a hazard; however, when new systems, materials, and equipment that were not part of the original existing building are added, the new systems, materials, and equipment shall be subject to the edition of the USBC in effect at the time of their installation. Existing parts of such buildings not being reconstructed, renovated, or repaired need not be brought into compliance with the current edition of the USBC.

The International Plumbing Code (IPC) sets maximum flow standards (Section 604.4) for a variety of fixtures and appliances. These standards are presented in the following table:

Plumbing Fixture or Fixture Setting	Maximum Flow Rate or Quantity¹
Lavatory, private	2.2 gpm at 60 psi
Lavatory, public (metering)	0.25 gallon per metering cycle
Lavatory, public (other than metering)	0.5 gpm at 60psi
Shower head	2.5 gpm at 80psi
Sink faucet	2.2 gpm at 60psi
Urinal	1.0 gallon per flushing cycle
Water Closet	1.6 gallons per flushing cycle

¹ gpm – gallons per minute; psi – pounds per square inch

The current standards set a maximum limit of 2.5 gallons per minute (gpm) at 80 pounds per square inch (psi) for showers and 2.2 gallons per minute (gpm) at 60 pounds per square inch (psi) for private lavatories. Water closets are limited to 1.6 gallons per flushing cycle, and urinals are limited to 1.0 gallons per cycle. In addition, lavatories in public facilities are limited to 0.5 gpm, for those with standard valve or spring faucets, and 0.25 gallons per cycle for self-closing metering valves (IPC, 1996).

The USBC in Virginia was adopted from the IPC. States are permitted to develop plumbing codes that implement stricter measures than those imposed by the National Plumbing code. However, localities in Virginia must obtain State authorization to develop a stricter code.

Compliance with USBC

Isle of Wight currently enforces the 1996 regulations. The County will also evaluate incentive programs to encourage existing households to retrofit their homes with low-flow devices. An additional requirement will apply to car washes. Effective January 1999, all car washes must be equipped with an approved water recycling system.

WATER LOSS REDUCTION PROGRAM

Water Loss Audit

At the beginning of each fiscal year (July 1), a water loss audit will be conducted by the Isle of Wight Department of Utility Services to determine the volume and nature of lost and unaccounted-for water within the County's water supply systems. The audit will include both the County's distribution system and the County-operated community well systems. The purpose of this audit is to identify sources of demand that would normally escape detection by the metering system. This type of demand includes:

1. **Fire Fighting.** The County Fire Department will submit an estimate of all water used on a monthly basis, including water used for fire-fighting and for hydrant flushing.

2. Main Flushing: All main flushing performed by the Department of Utility Services will require the submittal of a water consumption estimate.
3. Theft. Any observed theft will be reported to the Department of Utility Services, and appropriate action will be taken. An estimate of the volume of water stolen will be submitted to the Department of Utility Services.
4. Main Breaks. All main breaks will require reporting by the Water Division of the estimated volume of water lost.
5. Tank Drainage. All draining of storage or hydro-pneumatic tanks in both the main distribution system and the community well systems will be reported.
6. Leaks. Upon completion of the first water loss audit, the Water Division will have a leak detection program, which will have as its goal the complete survey of all distribution pipes and mains within the County, to be phased in over the next five years.
7. Meter Errors. The County will replace meters at a rate such that a complete County-wide meter turnover takes place every fifteen years, which is the typical warranty period for water meters. The size of meters requested by commercial and industrial customers will be evaluated, and the developer will be consulted to help determine the appropriate meter size for a particular site based on water use and anticipated demand. Preventing the installation of oversized meters minimizes unwarranted waste of water.
8. Equipment Calibration. All meters at the well heads will be calibrated on a semiannual basis. There will be service to check and replace inaccurate meters. Large customer meters that are accessible will be field calibrated yearly. An ongoing maintenance program will be implemented to locate and repair plant pipe leaks at the water treatment facilities.

All forms for reporting leaks and unaccounted-for water loss will be maintained by the Isle of Wight County Department of Utility Services. These forms will be reviewed by Department of Utility Services personnel on a daily basis so that measures can be taken to reduce unaccounted for water loss.

Leak Repair Program

The owner of any residential unit, commercial establishment, or industrial establishment who is found, based on the water loss audit or by other methods, to be an excessive user of water due to leakage from water lines or plumbing fixtures on the premises will be notified by the Department of Utility Services. These owners will be required to repair and stop such leakage within a reasonable period of time, or will be subject to financial penalties.

Upon completion of the annual water loss audit, the percentage of unaccounted for water (UAFW) that is suspected to have resulted from leaks will be determined for each water supply system. If this component is equal to or greater than 10% of the total UAFW value of the subject system, the County will mobilize resources within a reasonable period of time to locate and assess the leak(s). Upon locating the leak(s), all reasonable efforts will be made to fully repair the leak(s) within 90-days of identification.

ECONOMIC INCENTIVES PROGRAM

Existing Program Elements

Normal residential bills are currently issued bimonthly by the Isle of Wight Department of Utility Services. Monthly bills are issued on commercial accounts. Bimonthly billing allows more frequent and timely distribution of water conservation educational brochures to customers. It also helps customers become aware of leaks more quickly and recognize the cost of high seasonal water use. In addition, bimonthly billing is useful in providing feedback on customer conservation efforts.

An increased cost rate takes affect when a 50,000 gallon billing period occurs. This increased rate deters higher water usage and is an incentive to conserve.

Planned Program Elements

The Isle of Wight Department of Utility Services will analyze its water rates annually. Rate setting goals will be as follows:

- Striving for Department of Utility Services self-sufficiency while maintaining the highest water quality standards.
- Recommending appropriate rates for water usage and special service charges that are equitable to all customers.
- Continuing a comprehensive water conservation policy by using public information and charges that will discourage nonessential use of water.

WATER USE EDUCATION PROGRAM

Planned Program Elements

Public education concerning the importance of water conservation is a key factor in reducing excessive water use. Education programs should include information about how drinking water is produced and why it is important to conserve. Providing consumers with a better understanding of the reasons conservation is necessary allows them to better appreciate and participate in conservation activities.

The public education program planned by Isle Of Wight County will include the following components:

1. Billing Inserts. Inserts will be included with water bills. The inserts will include information concerning water conservation techniques and leak detection strategies.
2. Brochures. Water conservation brochures and pamphlets will be made available to the public at Isle of Wight County government buildings and at exhibits set up during public events.
3. New Releases. News releases to the print media, radio, and television will keep the public informed. This process will be used not only during emergencies but also on a regular basis to keep the public informed about conservation-related issues.
4. School Education. Programs will be available for presentation by County staff at local schools. Programs will be targeted to specific age groups. Assistance will be made available for teachers who wish to develop their own water awareness programs.
5. Speakers. County staff will be available for speaking engagements or personal contacts. These individuals will work with local clubs and organizations to develop public awareness concerning the need to conserve water, along with other topics related to the water supply industry.

WATER REUSE OPTIONS

Water reuse may be either direct or indirect, and for potable or nonpotable uses. Direct reuse involves introducing highly treated, reclaimed water directly to a potable water distribution system, while indirect reuse involves returning treated wastewater to the environment for dilution and natural purification, and subsequent withdrawal for water supply. Potable reuse [which is referred to as recycle by the Virginia Department of Health (VDH)] is the specific use of treated wastewater as a drinking water source.

Indirect potable reuse occurs widely in the United States each time treated wastewater effluent is discharged to a natural waterway upstream of a water supply intake. In most cases, it is unintentional. Past experience indicates that indirect reuse was acceptable because the application of water and wastewater treatment techniques, the near-universal use of some form of disinfectant, and the natural dilution and purification that occurs in natural waterways adequately treated the water. However, in recent years the effectiveness of these measures in protection against viral and trace organic contaminants has come under increasing scrutiny. Unplanned and unintentional reuse of this type is classified as uncontrolled potable reuse, and represents the overwhelming majority of cases of indirect potable reuse.

Planned Program Elements

Potable Reuse. In 1992, the Hampton Roads Sanitation District (HRSD) suggested to Hampton Roads area communities the delivery of reclaimed water to supplement drinking water reservoir supplies. In response to HRSD's presentation of a reuse concept proposal, and resulting concerns expressed by water purveyors in southeastern Virginia, the Virginia Department of Health prepared a *Recycle Issues* paper dated November 24, 1992. The VDH stated its opposition to both direct and indirect potable reuse projects when naturally occurring sources of water are available. The VDH insists that the highest quality, best source of water be selected when alternatives are available. The VDH also listed several other requirements that would apply to a potable reuse project, pertaining to independent monitoring, dilution, and liability, removal of biological hazards and toxics, and utilization of natural purification processes. Given the current position of the VDH, reuse of wastewater treatment plant effluent for potable purposes is not deemed a practicable reuse alternative to conserve water.

Nonpotable Reuse. Many industrial water demands are for nonpotable uses. One method of reducing demands on potable water sources is to supply nonpotable demands using treated wastewater plant effluent. Detailed regulations for implementation of a water reuse project do not exist in the Commonwealth of Virginia. Permitting of a water reuse project would most likely involve both the VDH and the VDEQ. In addition, a Virginia Pollution Discharge Elimination System (VPDES) Permit would be required for discharge to state waters if the flow is not contaminated during its use; if it is contaminated, the approval of VDH and/or VDEQ would be required.

Several states, including California, Arizona, Texas, Utah and Florida, have developed regulations and statutes that specify the required minimum quality of reclaimed water, depending on the intended use of the water. In general, the requirements become more stringent as the likelihood of public contact increases. In California, if treated reclaimed water for industrial use meets the state's standards for full body contact recreation, workers are not required to avoid contact with the water or wear protective clothing. However, precautions are required should the treated reclaimed water fail to meet these criteria. With the approval of state and local health departments, reclaimed water can be used for soil compaction, dust control, and other construction purposes.

As mentioned previously, recycling will be required in all new car washes, and existing car washes will be required to be retrofitted. In addition, required recycling systems are being considered for all new construction and all repair or replacement of continuous flow devices, including any water connector, device, or appliance which requires a continuous flow of 5 gallons per minute or more.

Typically, nonpotable markets for reused water include irrigation uses, industrial uses, and creation of recreational lakes. Many factors affect the market for reused water, including:

- Size and location of demand.
- Water quality requirements.

- Degree of treatment required for discharge.
- Cost of reclaimed water.
- Cost and availability of alternative supplies.

It is likely that additional reuse methodologies will be evaluated in the future. Industries within the service area that use large quantities of water are continually evaluating their processes, and looking for ways to lower production costs. For these industries, water represents one of their greatest operating expenses. It is in the best interest of these industries to stay abreast of the latest reuse technologies, and employ them whenever feasible.

Future Program Elements

The Isle of Wight County Department of Utility Services will evaluate its water conservation programs on a continual basis. As part of this process, new water reuse technologies will be researched and evaluated to determine their applicability in the service area. Continued communication with large water users will create possibilities for more efficient use of water resources.

WATER USE RESTRICTIONS

Emergency Use Restriction Plan

Emergency situations, such as severe drought, may threaten the regional water supply. During these times, the implementation of use restrictions is necessary to protect the water supply from further depletion. Use restrictions are considered a form of conservation because they result in demand reductions, but they are implemented only during periods when the regional water supply is threatened. Such restrictions are reserved as contingency measures for emergency situations, and are more restrictive than normal conservation measures that are used continually to reduce demands. Use restrictions are commonly implemented using a tiered approach, and are activated in relation to specific storage levels of a system's raw water supply.

Isle of Wight County has developed a four-tiered use restriction plan. **Article VIII of Section 16.1** in the Isle of Wight County Code presents the procedures used in detail (see Appendix to this section). When the Board of Supervisors finds that the immediate potential for a water shortage exists, the Director of Utility Services is authorized to implement conservation measures. The four tiers of use restrictions are as follows:

- Tier 1 – Voluntary Use Restrictions: Voluntary Use Restrictions are employed as a first stage in reducing water demands during a potential water shortage. These restrictions are encouraged by the water utility, but compliance is not required. When Tier 1 is in effect, the public will be asked to employ restraint in water usage, and to conserve water voluntarily by whatever methods are available.

- Tier 2 – Mandatory Use Restrictions: Mandatory Use Restrictions are put into effect when very limited supplies of water are available. These restrictions focus on the elimination of outdoor, nonessential uses of water. In Tier 2, compliance is mandated by a local ordinance, and the restrictions are enforced with penalties for violations.
- Tier 3 – Mandatory Reductions: Mandatory reductions in water use will be used to further reduce water usage under the most severe drought conditions. Non-residential users will be allotted a percentage reduction based on their average monthly and/or previous bimonthly consumption. Residential customers will be limited to a specific volume or percentage reduction of water per quarter. A surcharge of 10 dollars for every 100 cubic feet of water consumed above the allotted volume will be applied.
- Tier 4 – Water Rationing: When only crucial supplies of water are available, the Director of Utility Services or the Director of DEQ will restrict water use to the purposes that are essential to life, health and safety.

These restrictions will be implemented, and other restrictions may also be implemented whenever requirements for mandatory water use restrictions during water shortage emergencies are declared by the Director of the Department of Environmental Quality (DEQ).

When determining the level of use restriction to be implemented, the Director of Utility Services should consider water levels, available storage, drawdown rates, projected supply capability, system purification and pumping capacity, daily and projected water consumption, prevailing and forecasted weather conditions, fire service requirements, pipeline conditions, supplementary source data, estimates of minimum essential supplies to preserve public health and safety, and other pertinent data. The restrictions do not apply to any governmental activity, institution, business, or industry which is declared by the Director of Utility Services to be necessary for public health, safety and welfare, or on which the restrictions would place severe economic hardship or cause substantial loss of employment.

Enforcement

No enforcement or penalties are involved with Tier 1 because compliance with this tier is strictly voluntary. A violation of Tiers 2, 3 or 4 will result in a fine not to exceed five hundred dollars, in addition to any additional charges that apply to the violation. Each day of a continued violation will be considered a separate offense. In addition, the Director of Utility Services can suspend water service to any person violating the use restrictions. If water service is terminated, a reconnection fee of fifty dollars plus all outstanding fees and fines must be paid before service is restored.

SUMMARY OF CONSERVATION PLAN

The Isle of Wight Water Conservation Management Plan will aid the County in meeting its water supply needs over the next decade. The Plan includes a variety of elements to be implemented on a regular basis. Water saving plumbing, as described in the USBC, will be required. Economic incentives will encourage conservation. Annual water loss audits and a leak reduction program will reduce water loss. An education program will help the public to understand the importance of conservation and methods by which conservation can be achieved. Evaluation of the potential for reuse of treated wastewater, especially for industry, will be completed for all new facilities. In addition, a four-tiered approach to reducing water consumption during emergency conditions will protect the County's water supplies.

A combination of the water conservation measures to be implemented under normal conditions and the emergency use restrictions described in this document will reduce finished water demand. Through a combination of new supply sources and water conservation, the County will be able to supply predicted water demands into the future.

**WATER CONSERVATION AND MANAGEMENT PLAN
DEPARTMENT OF UTILITY SERVICES
APPENDIX**

ARTICLE VIII. EMERGENCY PROCEDURES DURING WATER SHORTAGES

Sec. 16.1.36. Purpose.

During the continued existence of climatic, hydrological and other extraordinary conditions, the protection of the health, safety and welfare of the residents of the County of Isle of Wight and the other customers served by the County water system may require that certain uses of water, nonessential to public health, safety and welfare, be reduced, restricted or curtailed; and as the shortage of potable water may become increasingly more critical, conservation measures to further reduce consumption or curtail essential water use may be required.

Sec. 16.1.37. Procedures.

- (a) The Board of Supervisors finds that when there exists an immediate potential for a shortage of potable water in the County of Isle of Wight's water system, increasingly more restrictive conservation measures may be required to prevent a crucial water shortage;
- (b) The Director of Utility Services is hereby directed to implement conservation measures at such times by ordering the restricted use of absolute curtailment of the use of water for certain nonessential purposes for the duration of the water shortage in the manner hereinafter set out. In exercising his discretionary authority and making the determinations set forth herein, the Director of Utility Services shall give due consideration to water levels; available/usable storage on hand; drawdown rates; the projected supply capability in water sources available to the system; system purification and pumping capacity; daily water consumption and consumption projections of the system's customers; prevailing and forecasted weather conditions; fire service requirements; pipeline conditions including breakage, stoppages and leaks; supplementary source data; estimates of minimum essential supplies to preserve public health and safety; and such other data pertinent to the past, current and projected water demands;
- (c) The provisions of this article, or regulations promulgated hereunder by the Director of Utility Services which are hereby authorized, shall not apply to any governmental activity, institution, business or industry which shall be declared by the Director of Utility Services, upon a proper showing, to be necessary for the public health, safety and welfare, or the prevention of severe economic hardship or the substantial loss of employment;
- (d) Upon a determination by the Director of Utility Services of the existence of the following conditions, the Director of Utility Services shall take the following actions:
 - (1) *Condition I:* When moderate but limited supplies of water are available, the Director of Utility Services shall, through appropriate means, call upon the general population to employ prudent restraint in water usage, and to conserve water voluntarily by whatever methods available.

- (2) *Condition 2:* When very limited supplies of water are available, the Director of Utility Services shall order curtailment of less essential usage of water, including, but not limited to, one or more of the following:
- a. The watering of shrubbery, trees, lawns, grass, plants or any other vegetation, except indoor plantings, greenhouse or nursery stocks, and except watering by commercial nurseries of freshly planted plants upon planting and once a week for five (5) weeks following planting;
 - b. The washing of automobiles, trucks, trailers, boats, airplanes, or any other type of mobile equipment, excepting in facilities operating with a water recycling system approved by the Director of the County provided, however, that any facility operating with a water recycling system shall permanently display in public view a notice approved by the Director of Utility Services stating that such recycling system is in operation. In lieu of the provisions hereof, the Department of Utility Services may curtail the hours of operation of commercial enterprises offering such services in washing their own equipment;
 - c. The washing of streets, driveways, parking lots, service station aprons, office buildings, exteriors of homes or apartments, or other outdoor surfaces;
 - d. The operation of any ornamental fountain or other structure requiring a similar use of water;
 - e. The filling of swimming and/or wading pools, or the refilling of swimming and/or wading pools that were drained after the effective date of the Director of Utility Services' order;
 - f. The use of water from fire hydrants for any purpose other than fire suppression or other public emergency.
- (3) *Condition 3:* When critically limited supplies of water are available, the Director of Utility Services shall institute mandatory reductions to each customer as follows:
- a. Industrial, institutional, commercial, governmental, wholesale, and all other non-residential customers shall be allotted a percentage reduction based on their average monthly and/or previous bimonthly consumption;
 - b. Individual residential customers shall be limited to a specific volume or percentage reduction of water per quarter;
 - c. If the allotted monthly and/or bimonthly water usage is exceeded, the customer shall be charged ten dollars (\$10.00) for every one hundred (100) cubic feet of water consumed above the allotted volume. Where prior consumption data is not available, the Director of Utility Services shall estimate allocations based on the data available from similar activities of equal intensity.
- (4) *Condition 4:* When only crucial supplies of water are available, the Director of Utility Services shall restrict the use of water to purposes which are absolutely essential to life, health and safety.

Sec. 16.1.38 Written report required.

The determination of Conditions 2, 3, and 4 by the Director of Utility Services shall be accompanied by a written report, which shall set out criteria utilized and data relied upon in making such determination including a narrative summary supporting the determination. Each report shall be promptly filed with the Count clerk, who shall make the same available for public inspection. The Director of Utility Services shall forthwith transmit a copy of each report to the Board of Supervisors.

Sec. 16.1.39 Penalties for noncompliance.

- (a) Any person who shall violate any provision of this article, or any of the conservation regulations promulgated by the Director of Utility Services pursuant thereto, shall, upon conviction thereof, in addition to additional charges and/or other actions set forth herein, be fined not more than five hundred dollars (\$500.00). Each act, or each day's continuation of a violation, shall be considered a separate offense;
- (b) In addition to the foregoing, the Director of Utility Services may suspend water service to any person violating the provisions of this article or the regulations promulgated hereunder. If such water service is terminated, the person shall pay a reconnection fee of fifty dollars (\$50.00) plus all outstanding fines and fees before service will be restored.

Sec. 16.1.40. Notice of cessation of emergency.

The Director of Utility Services shall notify the Board of Supervisors when the resource shortage is over and the emergency situation no longer exists.

COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

PERMIT ISSUANCE FACT SHEET

Groundwater Withdrawal Permit Number: GW0051901

Application Date: March 19, 2018

The Department of Environmental Quality (Department or DEQ) has reviewed the application for a Groundwater Withdrawal Permit. This document provides the pertinent information concerning the legal basis, scientific rationale, and justification for the issuance/reissuance/modification of the Groundwater Withdrawal Permit listed below. Based on the information provided in the application and subsequent revisions, the Department has determined that there is a reasonable assurance that the activity authorized by the permit is a beneficial use as defined by the regulations. Groundwater impacts have been minimized to the maximum extent practicable. The following details the application review process and summarizes relevant information for developing the Permit and applicable conditions.

Permittee / Legal Responsible Party

Name & Address: Isle of Wight County
13048 Poor House Road, P.O. Box 108
Isle of Wight, VA 23397
Phone: (757) 365-1650

Facility Name and Address

Name & Address: Sandy Mount Community Water System
201 Pinehurst Drive
Smithfield, VA 23430
Phone: (757) 365-1650

Contact Information:

Name: Don Jennings
E-mail: djennings@isleofwightus.net
Phone: (757) 365-1655 (office); (757)604-3155(cell)

Proposed Beneficial Use Type: The permitted withdrawal will be used to provide water for a municipal public water supply.

Staff Findings and Recommendations

Based on review of the permit application, staff provides the following findings.

- The proposed activity is consistent with the provisions of the Ground Water Management Act of 1992, and will protect other beneficial uses.
- The proposed permit addresses minimization of the amount of groundwater needed to provide the intended beneficial use.
- The effect of the impact will not cause or contribute to significant impairment of state waters.
- The permit reflects the required consultation with and full consideration of the written recommendations of the Virginia Department of Health (VDH).

Staff recommends Groundwater Withdrawal Permit Number GW0051901 be issued as proposed.

Approved:

Scott Morris, DBA, P.E.
Director, Water Division

Date:

Processing Dates

Processing Action	Date Occurred/Received
Pre-Application Meeting:	August 9, 2017
Application Received by DEQ:	March 27, 2018
Permit Fee Deposited by Accounting:	March 29, 2018
Application Review Conducted:	November 9, 2018
Notice of Deficiency Sent	NA
Request for Additional Information Sent:	NA
Local Government Ordinance Form Received by DEQ:	March 27, 2018
Application Complete:	April 7, 2021
Submit Request for Technical Evaluation:	April 26, 2021
Technical Evaluation Received by DEQ:	April 30, 2021
Draft Permit Package Sent:	February 28, 2023
Submit Draft Permit for Public Notice:	April 26, 2023
Public Notice Published:	May 3, 2023
End of 30-Day Public Comment Period:	June 2, 2023
Response to Public comment:	
Public Meeting or Hearing:	

Application

Application Information**Description:****Background / Purpose of Facility:**

The system was constructed in the 1970's with the two original wells, Old Well #1 and Smithfield Heights #1, installed in 1971 and 1973. The two current production wells are SM-1 (DEQ Well # 146-00316) and SM-2 (DEQ Well # 146-00322). The system was initially permitted under GW0033000 for 11,700,000 gallons per year (gal/yr). Groundwater Withdrawal Permit GW0051900 was issued in 2008 for 16,242,500 gal/yr and 1,937,500 gallons per month (gal/mo) to account for 25 homes being added to the system. The previous permit (GW0051900) expired May 31, 2018 and was administratively continued pursuant to 9VAC25-610-96. The system supplies the Sandy Mount Community including Smithfield Heights with mostly residential connections and a few businesses.

Location of Facility/Withdrawal:

Water Supply Planning Unit: Hampton Roads PDC

County: Isle of Wight

GWMA/Aquifer: Eastern Virginia GWMA / Potomac aquifer

Conjunctive Use Source: No conjunctive use.

Withdrawal Use, Current Need, and Projected Demand:

Basis of Need:

The system supplies the Sandy Mount Community including Smithfield Heights and was serving 191 connections, at the time of application. The connections are mostly residential with a few businesses making up about 5% of the withdrawal. The community is located on the north side of Scotts Factory Road (Route 620) at Pinehurst Drive, approximately two miles east of the intersection of Routes 620 and US258 and about 3 miles southeast of the Town of Smithfield.

Water Demand and Projections:

The applicant evaluated the past water use from 2008 through 2017 and found the highest annual water use of 12,060,000 gal in 2008. The highest monthly amount during this period was 1,406,000 gal in July 2008. These values were used as the amount required to supply the current system connections. For the 191 connections at the time of application, this equates to 63,145 gallons per year per connection (gal/yr/c) and 7,360 gallons per month per connection (gal/mo/c). This equates to 173 gallons per day per connection (gal/day/c) annually and 237.5 gal/day/c as a monthly high.

The applicant anticipated the 9 remaining lots being added to the water system over the ten-year permit term and thus, included the 9 lots in future demand projections. Based on 200 connections (191 + 9 new) at 63,145 gal/yr/c, an annual amount of 12,629,000 gal/yr was determined along with a monthly amount of 1,472,500 gal based on the 7,360 gal/mo level for 200 connections. This request represents about a 21% decrease from the 2008 permitted amounts of 16,242,500 gal/yr and 1,937,500 gal/mo.

Withdrawal Volumes Requested: The applicant requested the following withdrawal volumes based upon the projected groundwater demand.

Period of Withdrawal	Total Volume (gal)	Volume in gal/day
Maximum Monthly:	1,472,000	47,484
Maximum Annual:	12,629,000	34,600

Department Evaluation

Historic Withdrawals:

From 2008 through 2017 the highest annual water use of 12,060,000 gal in 2008 and the highest monthly usage was 1,406,000 gal in July 2008. The withdrawal has gradually decreased since 2008 and has been in the mid 8,000,000 gal/yr range since 2018.

Analysis of Alternative Water Supplies:

The nearest larger system that could potentially supply the Sandy Mount system is the Town of Smithfield approximately 3 miles away, which is also supplied by groundwater. The nearest surrounding development, the Newport Development Service District in Isle of Wight County, is contracted to be provided with 1,000,000 gallons per day (gal/day) of treated water from the City of Suffolk; however, the Sandy Mount Community is not part of this district. There are no nearby surface water bodies with

sufficient flow to support the community water supply needs. The cost of installing extensive water lines or treatment for this small community are currently prohibitive.

Public Water Supply:

The water system operates under VDH WWOP #3093580 with an effective date of June 30, 1995, and the associated Engineering Description Sheet (EDS) with an effective date of June 2, 2009. The permitted design capacity on the updated EDS is 80,000 gal/day with source capacity stated to be the limiting factor.

Water Supply Plan Review:

Water use for the system was included in the regional Water Supply Plan (WSP) with an approximate 30,000 gal/day average which aligns well with the requested amount. No alternative water supplies were noted in the WSP for consideration.

Department Recommended Withdrawal Limits:

The requested amount represents a significant reduction from the previously permitted amount and indicates conservative use of the resource.

The Department recommends the following withdrawal volumes based upon evaluation of the groundwater withdrawal permit application. The values are rounded from the requested amount in accordance with the Department's rounding policy.

Period of Withdrawal	Total Volume (gal)	Volume in gal/day
Maximum Monthly:	1,500,000	48,387
Maximum Annual:	12,700,000	34,795

Technical Evaluation:

Aquaveo, LLC performed a technical evaluation of the application for the Department based on the VAHydro Groundwater Eastern Virginia Model (VAHydro-GW-VCPM). The objectives of this evaluation were to determine the areas of any aquifers that will experience at least one foot of water level decline due to the proposed withdrawal (the Area of Impact or AOI), to determine the potential for the proposed withdrawal to cause saltwater intrusion, and to determine if the proposed withdrawal meets the 80% drawdown criteria. Aquaveo, LLC also evaluated water levels in the Eastern Virginia Model compared to measured field values.

The Department concluded that the proposed withdrawal satisfies the technical evaluation criteria for permit issuance. A summary of the results of the evaluation and the AOI for the Potomac Aquifer is provided in the Technical Evaluation (Attachment 1).

Part I
Operating Conditions

Authorized Withdrawals:

Owner Well Name	DEQ Well #	Aquifer	Type	Pump Intake Limit (ft/bls)
SM-1	146-00316	Potomac	Production	372
SM-2	146-00322	Potomac	Production	372

Apportionment:

Although the withdrawal percentage from each well varies month to month, the wells are used fairly evenly and a 50/50 apportionment was requested. The two wells withdrawal from the same aquifer, are close together, and the requested withdrawal did not produce an AOI that extended beyond the property boundary. Given this situation, no apportionment limits were necessary.

Additional Wells:Abandoned Wells:

Owner Well Name/ DEQ Well Number	DEQ Well #	Aquifer
Smithfield Heights 1 (SH-1)	146-00233	Potomac
Smithfield Heights 2 (SH-2)	146-00282	Potomac
Old Well #1	146-00149	Potomac

Out of Service Wells:

Owner Well Name/ DEQ Well Number	DEQ Well #	Aquifer
Test Well	146-00323	Potomac

Observation Wells: There are no observation wells associated with the system.

Pump Intake Settings:

Department staff reviewed available information and made the following determinations regarding the location of the aquifer tops for the following well. Information reviewed in this process included GW-2 forms for the system wells, driller's logs, the geophysical log for SM-1 (DEQ Well # 146-00316) and The Virginia Coastal Plain Hydrogeologic Framework (USGS Professional Paper 1731).

Unit	Well SM-1 (ft/bls)
Yorktown-Eastover	*-170
Piney Point	255-270
Aquia	317-369
Potomac	372-1380 (bottom estimated)

*Insufficient information to determine Yorktown-Eastover aquifer top

Given the close proximity of the two wells, the aquifer top and pump intake limit for Well SM-2 was extrapolated from Well SM-1. Both well pumps are correctly positioned in accordance with 9VAC25-610-140 A 6 at 302 and 326 feet below land surface (ft/bls) for Well SM-1 and SM-2 respectively.

Withdrawal Reporting:

Groundwater withdrawals are to be recorded monthly and reported quarterly.

Water Conservation and Management Plan:

A Water Conservation and Management Plan (WCMP) meeting the requirements of 9VAC25-610-100 B was submitted and reviewed as part of the application process. The accepted Plan is to be followed by the permittee as an operational Plan for the facility/water system, is incorporated by reference into this permit, and shall have the same effect as any condition contained in this permit and may be enforced as such (Attachment 2). In addition, the Permit includes conditions requiring the following:

- Documentation that the leak detection and repair program defined in the WCMP has been initiated is due by the end of the first year of the permit term.
- A result of an audit of the total amount of groundwater used in the distribution system and operational processes is due by the end of the second year of the permit term.
- A report on the plan's effectiveness in reducing water use, including revisions to those elements of the WCMP that can be improved and addition of other elements found to be effective based on operations to date shall be submitted by the end of years four [date] and eight [date] of the permit term.

Mitigation Plan: The predicted AOI resulting from the Technical Evaluation does not extend beyond the service area boundaries. A Mitigation Plan was therefore not required for the permit.

Well Tags: Well tags will be transmitted by the Department after issuance of the final permit.

Part II
Special Conditions

With the exception of condition listed below, review of the applicant's application, well construction data, operations at the facility, and the Technical Evaluation of the application did not identify a need for water quality or water level monitoring or pump intake reset conditions in the permit. There are no new wells currently planned for construction during the permit term. Technical Evaluation of the application was based on model parameters and aquifer testing is not required at this time. Construction of observation

wells or well nests, and geophysical boreholes to assist in monitoring or characterizing the local or regional aquifer system are not required at this time.

Monitoring Well Maintenance:

The Permittee must continue to properly maintain Test Well (DEQ Well# 146-00323) as a monitoring well and the well must be secured and protected from vandalism or accidental use at all times with a locking cap or other secure cover. If the Permittee determines that the well is no longer needed, the Permittee shall permanently abandon Test Well (DEQ Well # 146-00323) in accordance with the Virginia Department of Health's Regulations (12VAC5-630-450) and submit documentation to the Department of Environmental Quality within 30 days of abandonment. At least two weeks prior to the scheduled abandonment, the Permittee shall notify the Department of the scheduled abandonment date.

Part III
General Conditions

General Conditions are applied to all Groundwater Withdrawal Permits, as stated in the Groundwater Withdrawal Regulations, 9VAC25-610.

Public Comment

The following sections will be completed after close of the public comment period.

Relevant Regulatory Agency Comments:

Summary of VDH Comments and Actions:

Public Involvement during Application Process:

Local and Area wide Planning Requirements: The Isle of Wight County Administrator certified on March 19, 2018, that the facility's operations are consistent with all ordinances. The Department received this certification on March 27, 2018.

Public Comment/Meetings:

The public notice was published in Smithfield Times on May 3, 2023. The public comment period ran from May 3, 2023 to June 2, 2023

Changes in Permit Part II Due to Public Comments**Changes in Permit Part III Due to Public Comments**

Attachments

- 1. Technical Evaluation**
- 2. Water Conservation and Management Plan**
- 3. Public Comment Sheet (*if warranted*)**

**COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY**

TECHNICAL EVALUATION FOR PROPOSED GROUNDWATER WITHDRAWAL

Date: April 26, 2021

Application /Permit Number: GW0051901

Owner / Applicant Name: Isle of Wight County

Facility / System Name: Sandy Mount Community Water System

Facility Type: Municipal Public Water Supply

Facility / System Location: 201 Pinehurst Drive, Smithfield, VA 23430

The Commonwealth of Virginia's Groundwater Withdrawal Regulations (9VAC25-610) provide that, for a permit to be issued for a new withdrawal, to expand an existing withdrawal, or reapply for a current withdrawal, a technical evaluation shall be conducted. This report documents the results of the technical evaluation conducted to meet the requirements for the issuance of a permit to withdraw groundwater within a Designated Groundwater Management Area (9VAC25-600).

This evaluation determines the:

- (1) The Area of Impact (AOI): The AOI for an aquifer is the areal extent of each aquifer where one foot or more of drawdown is predicted to occur as a result of the proposed withdrawal.
- (2) Water Quality: The potential for the proposed withdrawal to cause salt water intrusion into any portion of any aquifers or the movement of waters of lower quality into areas where such movement would result in adverse impacts on existing groundwater users or the groundwater resource
- (3) The Eighty Percent Drawdown (80% Drawdown): The proposed withdrawal in combination with all existing lawful withdrawals will not lower water levels, in any confined aquifer that the withdrawal impacts, below a point that represents 80% of the distance between the land surface and the top of the aquifer at the points where the one-foot drawdown contour is predicted for the proposed withdrawal.

Requested withdrawal amount:

Requested Withdrawal Amount	
Ten (10) Year Value	Not Applicable
Annual Value	12,700,000 (34,795 average gpd)
Monthly Value	1,500,000 (50,000 average gpd)

Requested Apportionment of Withdrawal:

The requested apportionment is a 50/50 allocation for the two wells.

Summary of Requested Withdrawal:

The system supplies the Sandy Mount Community serving 191 connections, at the time of application. The connections are primarily residential with a few businesses comprising approximately 5% of the total water withdrawal. The current production wells were installed in 2005 to replace the previous wells serving the interconnected Sandy Mount and Smithfield Heights communities due to exceedance of Primary Maximum contaminant Levels for fluoride.

Production Well(s):

Identification	Location	Construction	Pump Intake	Source Aquifer
Owner Well Name: SM-1 DEQ Well Number: 146-00316 MPID: 365643076383901	Lat: 36° 56' 43.4" Lon: -76° 38' 38.6" (datum NAD 1927) Elevation 55 ft-msl	Completion Date: 6/22/2005 Screens (ft/bls): 525-535 Total Depth (ft/bls): 610	302 ft/bls	Potomac
Owner Well Name: SM-2 DEQ Well Number: 146-00322 MPID: 365643076383801	Lat: 36° 56' 43.2" Lon: -76° 38' 38.3" (datum NAD 1927) Elevation 55 ft-msl	Completion Date: 5/18/2005 Screens (ft/bls): 525-535 Total Depth (ft/bls): 555	326 ft/bls (or 278 ft/bls per the VDH Permit)	Potomac

Out of Service Wells:

Identification	Location	Construction	Pump Intake	Source Aquifer
Owner Well Name: Test Well DEQ Well Number: 146-00323 MPID: 36564376383800	Lat: 36° 56' 43.5" Lon: -76° 38' 38.4" (datum NAD 1927) Elevation unknown	Completion Date: 2/25/04 Screens (ft/bls): 534- 544 Total Depth (ft/bls): 544	NA	Potomac

Abandoned Wells:

Identification	Location	Construction	Pump Intake	Source Aquifer
Owner Well Name: Smithfield Heights 1 (SH- 1) (In Well House) DEQ Well Number: 146-00233 MPID: 365648076385901	Lat: 36° 56' 48.0" Lon: -76° 38' 59.0" (datum NAD 1927) Elevation 70 ft-msl	Completion Date: 3/1/1973 ABN: 12/9/2008 Screens (ft/bls): 475-495 Total Depth (ft/bls): 495	NA	Potomac

Owner Well Name: Smithfield Heights 2 (SH-2) DEQ Well Number: 146-00282 MPID: 365635076390001	Lat: 36° 56' 48.02" Lon: -76° 38' 59.0" (datum NAD 1927) Elevation 75 ft-msl	Completion Date: 8/19/1988 ABN: 12/9/2008 Screens (ft-bls): 380-400 Total Depth (ft-bls): 400	NA	Potomac
Owner Well Name: Old Well #1 DEQ Well Number: 146-00149 MPID: 365645076390001	Lat: 36° 56' 43.5" Lon: -76° 38' 38.6" (datum NAD 1927) Elevation 65 ft-msl	Completion Date: 6/11/1971 ABN: 8/2/2005 Screens (ft/bls): 474-494 Total Depth (ft/bls): 494	NA	Potomac

Observation Wells: There are no observation wells associated with this system.

Geologic Setting:

The Sandy Mount Community Water System wells (applicant wells) are located in Isle of Wight County. The applicant's production wells are screened in the Potomac aquifer. USGS Professional Paper 1731¹, *The Virginia Coastal Plain Hydrogeologic Framework* (VCPHF), is the most recent study discussing the aquifers and confining units of the Virginia Coastal Plain. The study utilized numerous boreholes throughout the Virginia Coastal Plain to interpolate the elevations of the different hydrogeologic units found in the Coastal Plain.

The Potomac aquifer is the "largest, deepest, and most heavily used source of ground water in the Virginia Coastal Plain." The aquifer is underlain across its entire extent with basement bedrock. The aquifer is found below the Potomac confining zone. The aquifer is primarily composed "of fluvial-deltaic coarse-grained quartz and feldspar sands and gravels and interbedded clays." The nearest east-west geologic cross section, FD-FD', from the USGS Professional Paper 1731 is shown in the figure at the end of this report.

Hydrologic Framework:

Data from the VCPHF is reported in this technical report to illustrate the hydrogeologic characteristics of the aquifers in the Virginia Coastal Plain near the applicant well and identify major discrepancies between regional hydrogeology and site logs interpreted by the DEQ staff geologist. The Virginia Coastal Plain Model² (VCPM) framework was constructed by extracting the hydrogeologic unit tops and thicknesses from the VCPHF. The original USGS VCPM was updated and adapted for use in the VA-DEQ well permitting process and is referred to as VAHydroGW-VCPM.

¹ McFarland E. R., and Bruce T.S., 2006. The Virginia Coastal Plain Hydrologic Framework: U.S. Geologic Survey Professional Paper 1731. 118 p., 25 pls. (available online at <http://pubs.water.usgs.gov/pp1731/>).

² Heywood, C.E., and Pope, J.P., 2009, Simulation of groundwater flow in the Coastal Plain aquifer system of Virginia: U.S. Geological Survey Scientific Investigations Report 2009-5039, 115 p.

VAHydroGW-VCPM Model:

The following table lists the locations of the applicant production wells within the VAHydroGW-VCPM Model.

VAHydroGW-VCPM Model Grid				
Well	Well Number	MPID	Row	Column
SM-1	146-00316	365643076383901	101	49
SM-2	146-00322	365643076383801	101	49

The following aquifer top elevations and thicknesses are simulated in the VAHydroGW-VCPM Model at the model cell containing the applicant wells.

VAHydroGW-VCPM Model Hydrogeologic Unit Information		
Aquifer	Elevation (ft-msl)	Depth (ft-bls)
Surface	62	0
Water Table aquifer (bottom)	38	24
Yorktown-Eastover (top)	38	24
Yorktown-Eastover (bottom)	-113	175
Piney Point (top)	-193	255
Piney Point (bottom)	-215	277
Aquia (top)	-254	316
Aquia (bottom)	-280	342
Potomac (top)	-295	357
Potomac (bottom)	-1320	1382

Note: ft-msl = feet mean sea level

Groundwater Characterization Program Recommendations:

DEQ staff reviewed available information and made the following determinations regarding the location of the aquifer tops for the following well. Information reviewed in this process included GW-2 forms for the system wells, driller's logs, the geophysical log for SM-1, Well # 146-00316 and The Virginia Coastal Plain Hydrogeologic Framework (USGS Professional Paper 1731).

Unit	Well SM-1 (ft/bls)
Yorktown-Eastover	?*-170
Piney Point	255-270
Aquia	317-369
Potomac	372-1380 (bottom estimated)

*Insufficient information to determine Yorktown-Eastover aquifer top

Comparison of the Hydrogeologic Framework and Geologist Report:

The VCPMF identifies the top and thickness of the Potomac aquifer at an elevation of 357 ft-bls and 1,025 feet thick at the cell containing the applicant wells. The top elevation and thickness of the Potomac aquifer given by DEQ staff of 372 ft-bls and 1,008 ft are in general agreement with the VCPMF.

Pump Intake Elevation:

Virginia regulations specify that well pump intakes must be placed at or above the top of the source aquifer. Based on a review of available site information the pump intake elevations are in compliance with the limits specified by regulation³.

Water Level Comparison:

The *Virginia Coastal Plain Model (VAHydroGW-VCPM) 2019-2020 Annual Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use* report and modeling files⁴ provide two sets of simulated potentiometric water surface elevations. These water elevations are based upon, 1) the reported withdrawal amount of wells in the VAHydroGW-VCPM model ("the reported use simulation") and, 2) the total permitted withdrawal amount for wells in the VAHydroGW-VCPM model ("the total permitted simulation"). USGS regional observation network well water levels were compared to the water levels in the 2020 report in order to evaluate the performance of the regional model in the vicinity of the applicant wells and assess historical groundwater trends. In the tables below, simulated water levels from the year 2019, from the reported use simulation, were compared to USGS measured water levels for the same year. For comparison, the total permitted simulated water levels are also reported. The total permitted water levels are taken from the end of the 50 year total permitted simulation and represent simulated water levels, 50 years from present, if all GWMA wells were to pump at their total permitted amount.

The USGS regional observation network wells closest to the applicant wells are shown in Figure 1 and listed in the following tables. The depth of these wells corresponds with the Potomac aquifer. The distances from the applicant wells to the USGS wells are also given in the tables. The VAHydroGW-VCPM row and column containing the USGS wells are also given. The water levels obtained from the regional observation network wells are shown in Figures 2 and 3. These figures also show the water levels from the reported use VAHydroGW-VCPM simulation for the cell containing each USGS well. The 2019 annual average water levels observed in the regional observation network wells are given in the following tables.

The water level graph for the first well in the Potomac aquifer (57D 21 SOW 143A) shows a steady decline in water levels from the time of the earliest available records (1980) to about 2006. Water levels from 2006 to about 2010 show the water levels stabilizing. The water level then steadily increases from around 2010 to the present. The VAHydroGW-VCPM simulated reported use water levels are a few feet below USGS observed water levels, but are in general agreement.

The water level graph for the second well in the Potomac aquifer (58C 58 SOW 141B) also shows a steady decline in water levels from the time of earliest available records (1980) until about 2006. Water levels from 2006 to the present show a steady increase until the last several years at which time the water levels have been stabilizing. VAHydroGW-VCPM simulated reported use water levels are in general agreement with the USGS observed water levels at this location.

³ 9 VAC 25 610 140.A.5. "The permittee shall not place a pump or water intake device lower than the top of the uppermost confined aquifer that a well utilizes as a ground water source or lower than the bottom of an unconfined aquifer that a well utilizes as a ground water source;

⁴ Refer to "Virginia Coastal Plain Model (VAHydroGW-VCPM) 2019-2020 Annual Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use" at

<http://www.deq.virginia.gov/Programs/Water/WaterSupplyWaterQuantity/GroundwaterCharacterization/ReportsPublications.aspx>

Potomac Aquifer		
Measurement	Well 57D 21 SOW 143A	Well 58C 58 SOW 141B
Distance from nearest applicant well (miles)	4.7	6.7
Elevation (ft-msl)	73	52
VAHydroGW-VCPM Row	100	107
VAHydroGW-VCPM Column	45	52
VAHydroGW-VCPM Cell Elevation	79	18
USGS Regional Well 2019 Average Water Level (ft-bls)	142.1	133.5
USGS Regional Well 2019 Average Water Level (ft-msl)	-69.1	-81.5
VAHydroGW-VCPM 2019 Reported Use Simulated Water Level (ft-bls)	152.2	96.4
VAHydroGW-VCPM 2019 Reported Use Simulated Water Level (ft-msl)	-73.2	-78.4
VAHydroGW-VCPM Total Permitted Simulated Water Level (ft-bls)	182.5	127.9
VAHydroGW-VCPM Total Permitted Simulated Water Level (ft-msl)	-103.5	-109.9

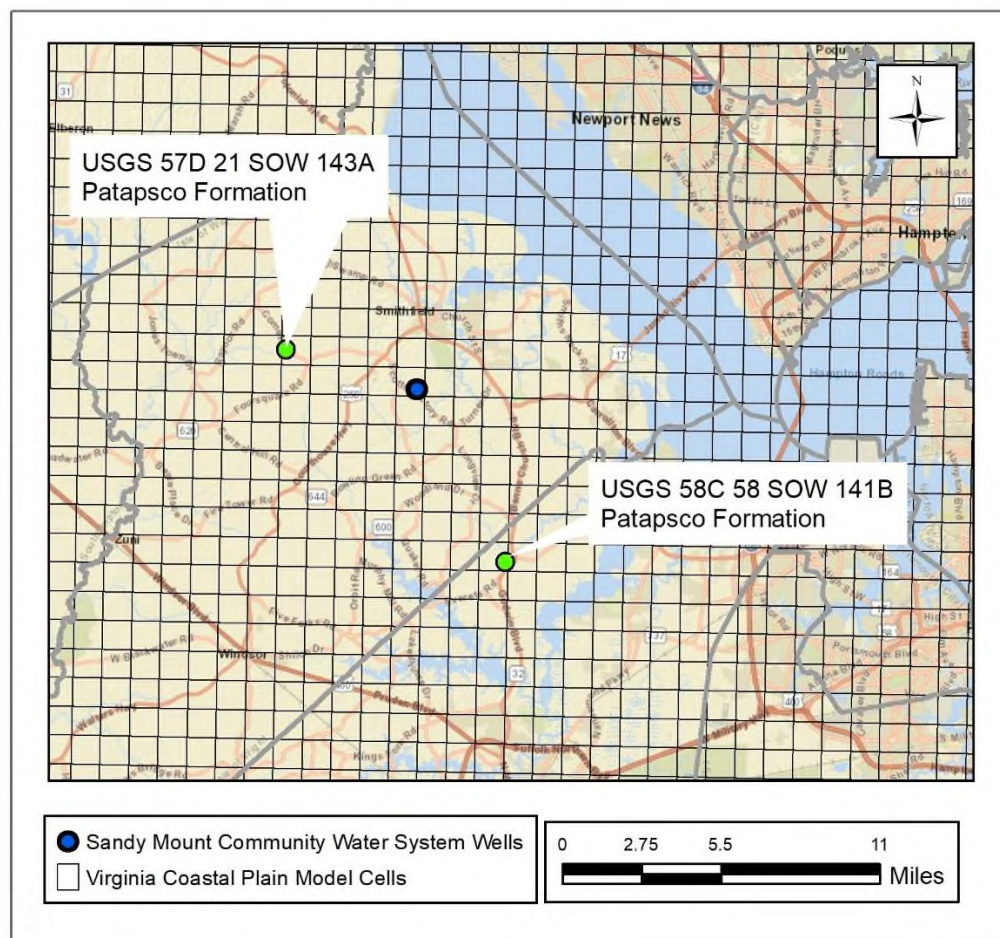


Figure 1. Nearest USGS regional observation network wells.

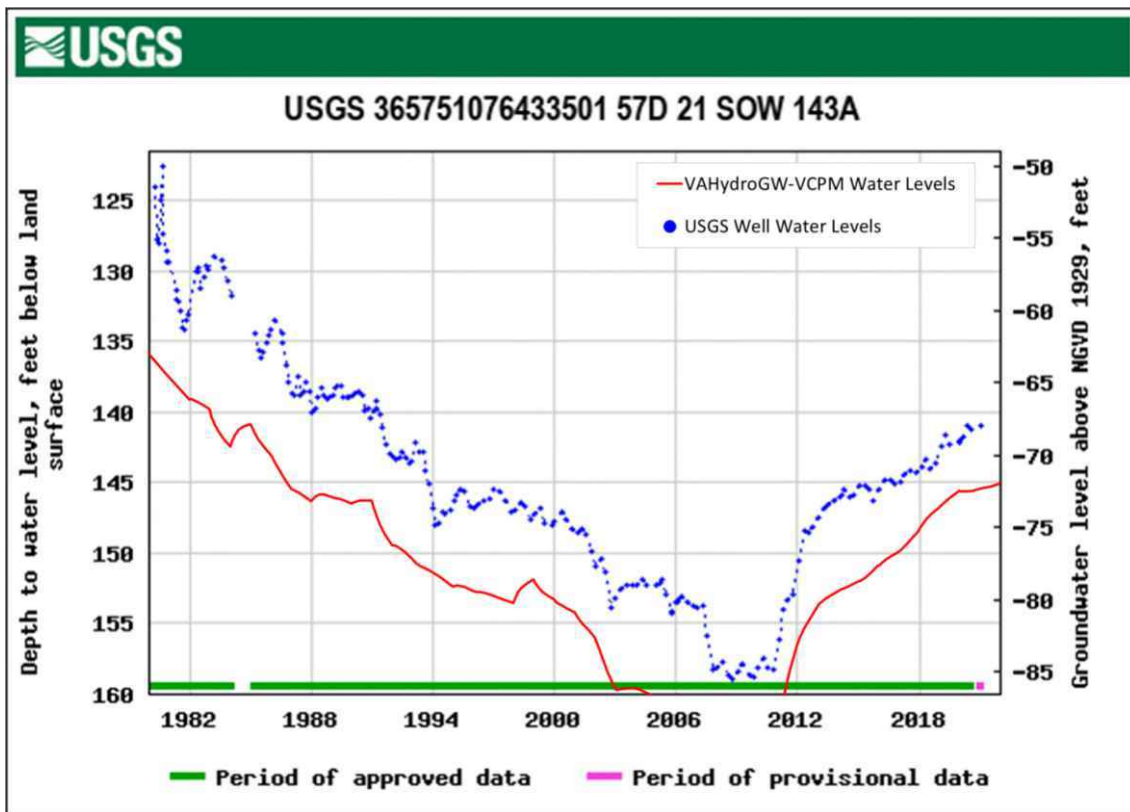


Figure 2. USGS Regional Observation Well 57D 21 SOW 143A, Potomac aquifer water levels (Patapsco Formation) recorded from 1980 to present (well depth 650 ft bls, land surface 73 ft msl) and VAHydroGW-VCPM reported use water levels.

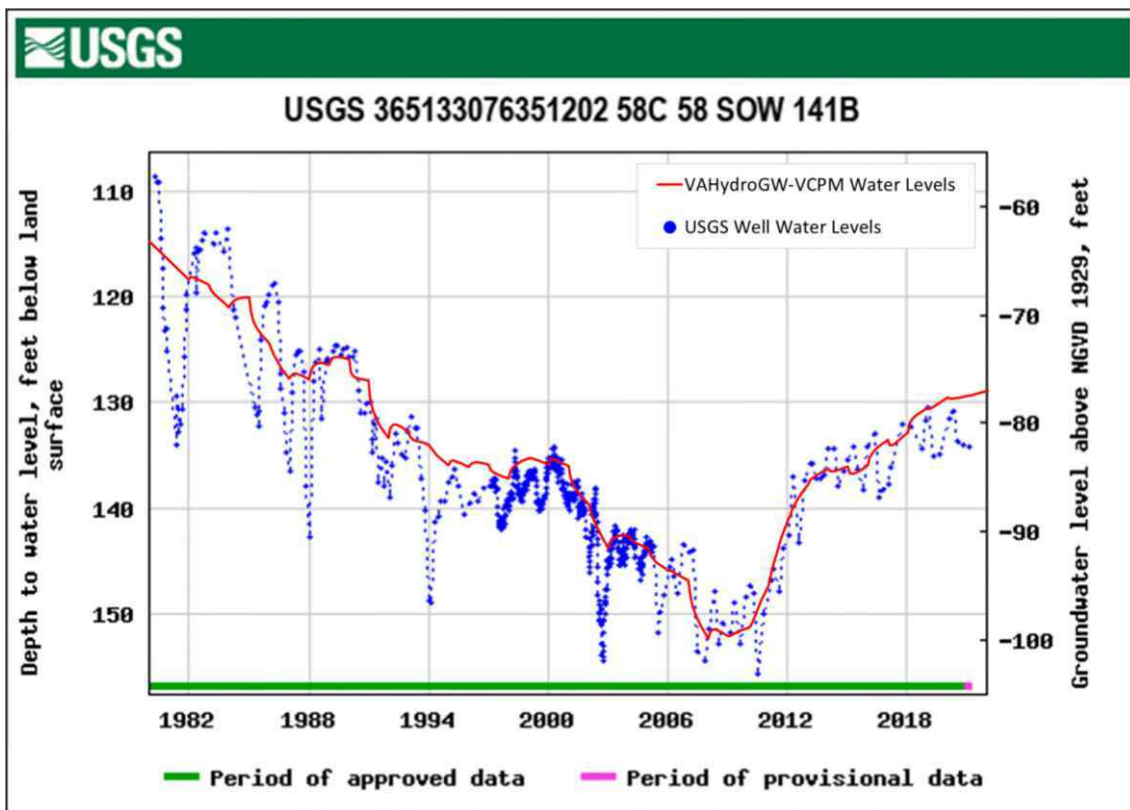


Figure 3. USGS Regional Observation Well 58C 58 SOW 141B, Potomac aquifer water levels (Patapsco Formation) recorded from 1980 to present (well depth 605 ft bls, land surface 52 ft msl) and VAHydroGW-VCPM reported use water levels.

Aquifer Test(s):

A 48-hour constant rate aquifer test was conducted in the Middle Potomac aquifer at Sandy Mount Manor beginning on August 16, 2005. DEQ staff found that the Hantush, 1964 solution⁵ was the best analytical solution for evaluating the aquifer test data. This solution assumes constant discharge from a partial penetrating well in a leaky aquifer. The wells are screened in the top 10 feet of the Middle Potomac aquifer. According to DEQ aquifer picks, the Middle Potomac aquifer could be up to 465 ft thick at this location, indicating that the partial penetration of the wells likely impacts the observed drawdown curve. The data also indicates leakage, making the Hantush, 1964 solution an appropriate tool for analysis. Matching the data to the Hantush, 1964 curve provided the following aquifer properties:

Transmissivity = 12,097 ft²/day

Storage Coefficient = 0.0296 (dimensionless)

r/B = 0.033 (dimensionless)

The hydraulic properties for the VAHydroGW-VCPM cell containing the applicant wells are shown in the following table.

Hydrogeologic Unit	Horizontal Conductivity (ft/day)	Transmissivity (ft ² /day)	Storage Coefficient	Specific Storage (1/ft)
Surficial (Columbia) aquifer	2	48	-	0.000032
Yorktown-Eastover aquifer	22.4	3,378.2	0.00486	0.000032
Piney Point aquifer	18.8	412.5	0.00071	0.000032
Aquia aquifer	109	2,834	0.00084	0.000032
Potomac aquifer	78.5	80,439.0	0.00191	0.00000186

Model Results

Evaluation of Withdrawal Impacts:

Due to the relatively small requested withdrawal rate, the properties from the previous technical evaluation completed in 2008 were used to simulate the drawdown caused by the proposed withdrawal using a 2-dimensional analytical simulation for this technical evaluation. The impacts of the proposed withdrawal were calculated using the Hantush and Jacob (1955) 2-dimensional analytical solution for leaky aquifers. Drawdown values for the source aquifer were calculated using the following parameters, which were obtained from the 2008 TE completed for the facility.

The requested apportionment of withdrawal was for a 50/50 allocation for the two wells. To simulate the impacts of this request and to allow for maximum flexibility in the operation of the wells, the entire requested withdrawal was simulated separately at each well and the resulting areas of impacts were used.

The aquifer parameters used for the 2D analytical simulations for this technical evaluation are listed below:

Model Input Parameters (source: Technical Evaluation of Sandy Mount Community Water System, Isle of Wight County, February 12, 2008):

Potomac Transmissivity, T	=	2,382 ft ² /day
Potomac Storage Coefficient, S	=	0.00705
Inverse Leakage Factor, 1/B	=	0.00794 ft ⁻¹

⁵ Hantush, M.S., 1964, *Hydraulics of Wells*, Advances in Hydroscience (V.T. Chow, editor), Vol. 1, pp. 281-432, Academic Press, New York.

Withdrawal rate/Simulation Time = 50 years at 12,700,000 gallons per year (34,795 gallons per day)

Area of Impact:

The AOI for an aquifer is the areal extent of each aquifer where one foot or more of drawdown is predicted to occur as a result of the proposed withdrawal. The Hantush-Jacob analytical simulation was executed as described above and simulated a Potomac AOI that extends approximately 6 feet from the applicant wells. A map showing the Potomac AOI is included at the end of this report.

Water Quality:

The regional model (VAHydroGW-VCPM) does not indicate any changes to regional flow patterns that would lead to reduced water quality.

80 % Drawdown:

The 80% criterion was evaluated using the VAHydroGW-VCPM and the Hantush-Jacob analytical simulation. A base simulation was developed to predict the impacts from all existing permits (except the applicant well) operating at their maximum withdrawal. The base simulation used the 2020 Total Permitted pumping rates and 2019 simulated Reported Use water levels as starting conditions. The base simulation was executed for 50 years. A second simulation was conducted using the 2D analytical simulation to simulate drawdown resulting from the applicant well using the parameters and withdrawal rate listed above in the *Model Input Parameters* section of this report. For the baseline simulation, the VAHydroGW-VCPM cell containing applicant wells (row 101/column 49) was simulated to have a potentiometric surface of -89.7 ft-msl for the Potomac aquifer. The 2D analytical simulation simulated a maximum drawdown of 1.9 feet for the Potomac aquifer.

Subtracting the maximum drawdown simulated in the analytical simulation from the simulated water levels in the baseline VAHydroGW-VCPM simulation at the cell nodes resulted in a simulated water level of -91.6 ft-msl for the Potomac aquifer. This approach for simulating the potentiometric surface elevation is the most conservative for the resource. The top elevation of the Potomac aquifer at VAHydroGW-VCPM row 101/column 49 is -295 ft-msl.

The 80% drawdown requirement allows the potentiometric surface (based on the critical surface elevation calculated from the VAHydroGW-VCPM data) to be reduced to -223.6 ft-msl in the Potomac aquifer at the cell node nearest the applicant wells. Therefore, the water level in the source aquifer is not simulated to fall below the critical surface.

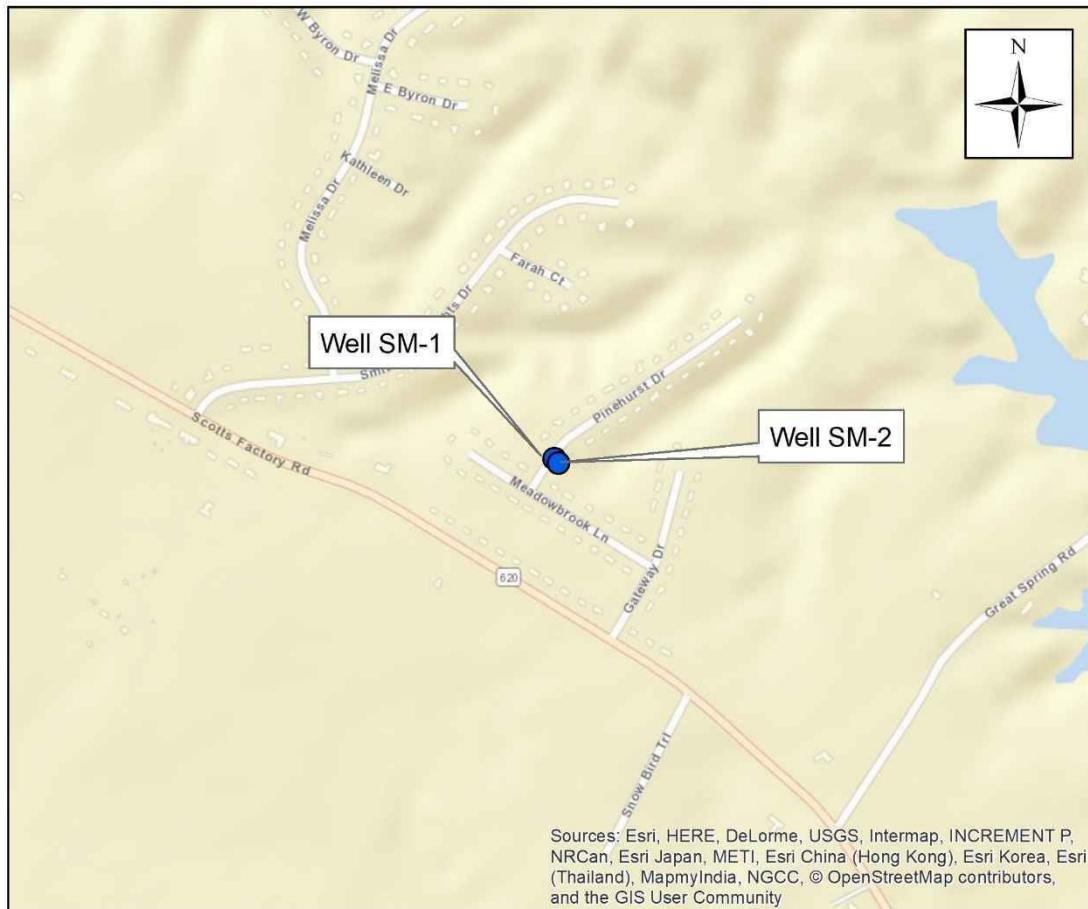
Additionally, the Potomac aquifer AOI does not contain or intersect any VAHydroGW-VCPM cells simulated to have potentiometric water levels below the 80% drawdown requirement. Therefore, this withdrawal is within the limits set by the 80% drawdown criterion.

The requested withdrawal is allocated to the Potomac aquifer. The technical evaluation analysis indicated that the apportionment of the requested withdrawal amount among the applicant production wells had no significant effect on the outcome of the technical evaluation.

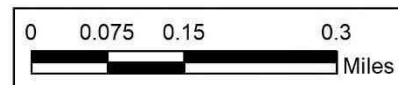
Conclusion:

The withdrawal requested by Isle of Wight County for Sandy Mount Community Water System satisfies the technical evaluation criteria for permit issuance. There are no existing permitted wells within the applicant's AOI.

Sandy Mount Community Water System Area of Impact - Potomac Aquifer



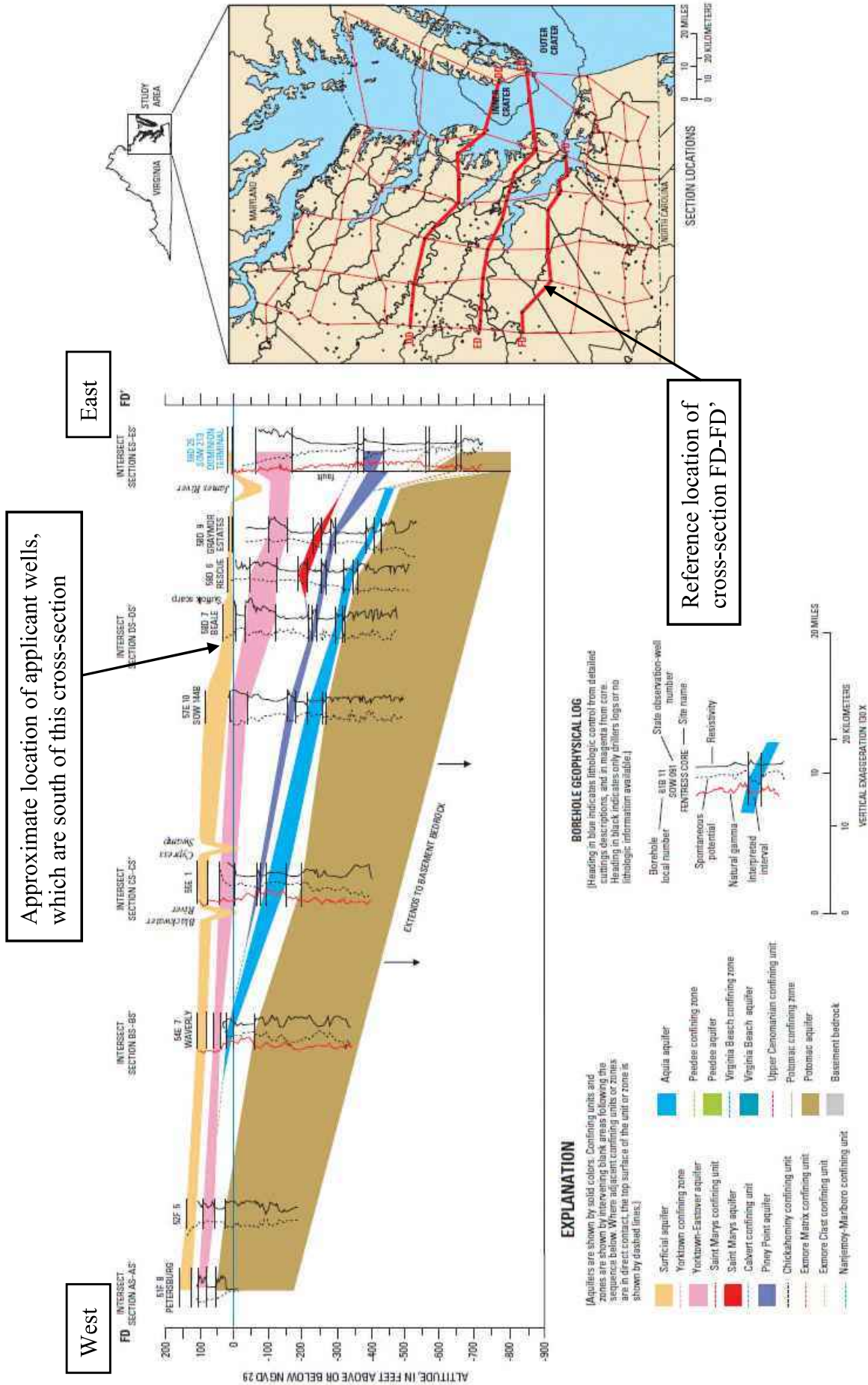
- Sandy Mount CWS Wells
- Potomac AOI



Simulated drawdown at or exceeding one foot in the Potomac aquifer resulting from a 2-dimensional Hantush-Jacob (1955) simulation of 50 years. Pumping was simulated separately at 12,700,000 gallons per year from the Potomac aquifer to allow for maximum flexibility in operations. Maximum radius of one-foot drawdown (Area of Impact) occurs 6 feet from the pumping center.

Technical Evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply Planning
April 30, 2021





Coastal Plain (2006) Cross Section FD-FD' from USGS Professional Paper 1731.

**DEPARTMENT OF UTILITY SERVICES
ISLE OF WIGHT COUNTY, VIRGINIA**

**WATER CONSERVATION
AND MANAGEMENT PLAN
ISLE OF WIGHT COUNTY, VIRGINIA**

MARCH 2018

**WATER CONSERVATION AND MANAGEMENT PLAN
ISLE OF WIGHT COUNTY, VIRGINIA**

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WATER CONSERVATION AND MANAGEMENT PLAN ISLE OF WIGHT COUNTY, VIRGINIA

INTRODUCTION

Need for Conservation

Water conservation involves both an increase in efficiency of water use and a reduction of water losses. The net result is a decrease in demand for treated water that can defer development of new resources and reduce the cost of future water service. Each gallon of water conserved is one less requiring storage, treatment and distribution. It may also represent one less gallon that has to be heated for washing or bathing, thus saving energy costs, or that must pass through a wastewater conveyance system and treatment before it is returned to the environment.

Conservation is an important complement to new supply sources. In some cases, conservation may eliminate the need for new sources of supply. Fresh water, like other natural resources, is a limited commodity that must be managed wisely to preserve the well being of future generations. Efforts to conserve existing supplies and efficient allocation of water resources are important during each stage of the water supply planning process.

The Isle of Wight County Department of Utility Services recognizes the need to conserve and effectively manage its water resources. Only by optimizing water use efficiency and reducing water loss can the County satisfy its projected water demands over the next five to ten years. While the search for additional long-term supplies must continue, every effort should be made to efficiently utilize currently available supplies.

Regulatory Requirements

The Groundwater Management Act of 1992 (House Bill 488) was approved in April 1992. It requires a Groundwater Withdrawal Permit (GWP) for certain groundwater withdrawals within declared Groundwater Management Areas (GMAs). Groundwater Withdrawal Regulation 9 VAC 25-610-10 et. seq. requires that applications for new GWPs within GMAs include a water conservation plan approved by the Virginia Department of Environmental Quality, Division of Water (DOW). An approved conservation program must include:

- Use of water-saving plumbing and processes including, where appropriate, the use of water-saving fixtures in new and renovated plumbing as provided under the Uniform Statewide Building Code (USBC).
- A water loss reduction program.
- A water use education program.
- An evaluation of potential water reuse options.

- Requirements for mandatory use reductions during water shortage emergencies declared by the local governing body or the Director of DEQ, including, where appropriate, ordinances prohibiting the waste of water generally and requirements for mandatory water use restrictions, with penalties during water shortage emergencies.

Plan Objectives

The primary objectives of this Water Conservation and Management Plan (the Plan) are to provide a documented, effective conservation strategy designed to reduce demand within Isle of Wight County, and to demonstrate compliance with the Groundwater Management Act of 1992. This Plan will provide methods by which water use efficiency can be increased, as well as procedures to guide the County and its customers through water supply emergencies. Updates of this Plan are anticipated periodically and the Virginia Department of Environmental Quality (VDEQ) will be copied with all updates.

Section 2.0 of this plan describes the use of water-saving plumbing and processes within the service area. Water loss reduction, economic incentives, water use education, and water reuse are discussed in Sections 3.0 through 6.0. The final section of this report describes the Use Restrictions Plan for Isle of Wight County.

WATER-SAVING PLUMBING AND PROCESSES

Uniform Statewide Building Code (USBC)

The Building Officials and Code Administrators (BOCA) organization is a nonprofit organization which develops a series of performance-oriented model codes (BOCA, 1990). These codes were adopted by the Commonwealth of Virginia as part of the Uniform Statewide Building Code (USBC) (DHCD, 1987). These codes directly specify the use of water conservation fixtures in commercial and residential applications.

The USBC applies to all new construction and some remodeling of existing structures. The USBC requires that:

When reconstruction, renovation, or repair of existing buildings is undertaken, existing materials and equipment may be replaced with materials and equipment of similar kind or replaced with greater capacity equipment in the same location when not considered a hazard; however, when new systems, materials, and equipment that were not part of the original existing building are added, the new systems, materials, and equipment shall be subject to the edition of the USBC in effect at the time of their installation. Existing parts of such buildings not being reconstructed, renovated, or repaired need not be brought into compliance with the current edition of the USBC.

The International Plumbing Code (IPC) sets maximum flow standards (Section 604.4) for a variety of fixtures and appliances. These standards are presented in the following table:

Plumbing Fixture or Fixture Setting	Maximum Flow Rate or Quantity¹
Lavatory, private	2.2 gpm at 60 psi
Lavatory, public (metering)	0.25 gallon per metering cycle
Lavatory, public (other than metering)	0.5 gpm at 60psi
Shower head	2.5 gpm at 80psi
Sink faucet	2.2 gpm at 60psi
Urinal	1.0 gallon per flushing cycle
Water Closet	1.6 gallons per flushing cycle

¹ gpm – gallons per minute; psi – pounds per square inch

The current standards set a maximum limit of 2.5 gallons per minute (gpm) at 80 pounds per square inch (psi) for showers and 2.2 gallons per minute (gpm) at 60 pounds per square inch (psi) for private lavatories. Water closets are limited to 1.6 gallons per flushing cycle, and urinals are limited to 1.0 gallons per cycle. In addition, lavatories in public facilities are limited to 0.5 gpm, for those with standard valve or spring faucets, and 0.25 gallons per cycle for self-closing metering valves (IPC, 1996).

The USBC in Virginia was adopted from the IPC. States are permitted to develop plumbing codes that implement stricter measures than those imposed by the National Plumbing code. However, localities in Virginia must obtain State authorization to develop a stricter code.

Compliance with USBC

Isle of Wight currently enforces the 1996 regulations. The County will also evaluate incentive programs to encourage existing households to retrofit their homes with low-flow devices. An additional requirement will apply to car washes. Effective January 1999, all car washes must be equipped with an approved water recycling system.

WATER LOSS REDUCTION PROGRAM

Water Loss Audit

At the beginning of each fiscal year (July 1), a water loss audit will be conducted by the Isle of Wight Department of Utility Services to determine the volume and nature of lost and unaccounted-for water within the County's water supply systems. The audit will include both the County's distribution system and the County-operated community well systems. The purpose of this audit is to identify sources of demand that would normally escape detection by the metering system. This type of demand includes:

1. **Fire Fighting.** The County Fire Department will submit an estimate of all water used on a monthly basis, including water used for fire-fighting and for hydrant flushing.

2. Main Flushing: All main flushing performed by the Department of Utility Services will require the submittal of a water consumption estimate.
3. Theft. Any observed theft will be reported to the Department of Utility Services, and appropriate action will be taken. An estimate of the volume of water stolen will be submitted to the Department of Utility Services.
4. Main Breaks. All main breaks will require reporting by the Water Division of the estimated volume of water lost.
5. Tank Drainage. All draining of storage or hydro-pneumatic tanks in both the main distribution system and the community well systems will be reported.
6. Leaks. Upon completion of the first water loss audit, the Water Division will have a leak detection program, which will have as its goal the complete survey of all distribution pipes and mains within the County, to be phased in over the next five years.
7. Meter Errors. The County will replace meters at a rate such that a complete County-wide meter turnover takes place every fifteen years, which is the typical warranty period for water meters. The size of meters requested by commercial and industrial customers will be evaluated, and the developer will be consulted to help determine the appropriate meter size for a particular site based on water use and anticipated demand. Preventing the installation of oversized meters minimizes unwarranted waste of water.
8. Equipment Calibration. All meters at the well heads will be calibrated on a semiannual basis. There will be service to check and replace inaccurate meters. Large customer meters that are accessible will be field calibrated yearly. An ongoing maintenance program will be implemented to locate and repair plant pipe leaks at the water treatment facilities.

All forms for reporting leaks and unaccounted-for water loss will be maintained by the Isle of Wight County Department of Utility Services. These forms will be reviewed by Department of Utility Services personnel on a daily basis so that measures can be taken to reduce unaccounted for water loss.

Leak Repair Program

The owner of any residential unit, commercial establishment, or industrial establishment who is found, based on the water loss audit or by other methods, to be an excessive user of water due to leakage from water lines or plumbing fixtures on the premises will be notified by the Department of Utility Services. These owners will be required to repair and stop such leakage within a reasonable period of time, or will be subject to financial penalties.

Upon completion of the annual water loss audit, the percentage of unaccounted for water (UAFW) that is suspected to have resulted from leaks will be determined for each water supply system. If this component is equal to or greater than 10% of the total UAFW value of the subject system, the County will mobilize resources within a reasonable period of time to locate and assess the leak(s). Upon locating the leak(s), all reasonable efforts will be made to fully repair the leak(s) within 90-days of identification.

ECONOMIC INCENTIVES PROGRAM

Existing Program Elements

Normal residential bills are currently issued bimonthly by the Isle of Wight Department of Utility Services. Monthly bills are issued on commercial accounts. Bimonthly billing allows more frequent and timely distribution of water conservation educational brochures to customers. It also helps customers become aware of leaks more quickly and recognize the cost of high seasonal water use. In addition, bimonthly billing is useful in providing feedback on customer conservation efforts.

An increased cost rate takes affect when a 50,000 gallon billing period occurs. This increased rate deters higher water usage and is an incentive to conserve.

Planned Program Elements

The Isle of Wight Department of Utility Services will analyze its water rates annually. Rate setting goals will be as follows:

- Striving for Department of Utility Services self-sufficiency while maintaining the highest water quality standards.
- Recommending appropriate rates for water usage and special service charges that are equitable to all customers.
- Continuing a comprehensive water conservation policy by using public information and charges that will discourage nonessential use of water.

WATER USE EDUCATION PROGRAM

Planned Program Elements

Public education concerning the importance of water conservation is a key factor in reducing excessive water use. Education programs should include information about how drinking water is produced and why it is important to conserve. Providing consumers with a better understanding of the reasons conservation is necessary allows them to better appreciate and participate in conservation activities.

The public education program planned by Isle Of Wight County will include the following components:

1. Billing Inserts. Inserts will be included with water bills. The inserts will include information concerning water conservation techniques and leak detection strategies.
2. Brochures. Water conservation brochures and pamphlets will be made available to the public at Isle of Wight County government buildings and at exhibits set up during public events.
3. New Releases. News releases to the print media, radio, and television will keep the public informed. This process will be used not only during emergencies but also on a regular basis to keep the public informed about conservation-related issues.
4. School Education. Programs will be available for presentation by County staff at local schools. Programs will be targeted to specific age groups. Assistance will be made available for teachers who wish to develop their own water awareness programs.
5. Speakers. County staff will be available for speaking engagements or personal contacts. These individuals will work with local clubs and organizations to develop public awareness concerning the need to conserve water, along with other topics related to the water supply industry.

WATER REUSE OPTIONS

Water reuse may be either direct or indirect, and for potable or nonpotable uses. Direct reuse involves introducing highly treated, reclaimed water directly to a potable water distribution system, while indirect reuse involves returning treated wastewater to the environment for dilution and natural purification, and subsequent withdrawal for water supply. Potable reuse [which is referred to as recycle by the Virginia Department of Health (VDH)] is the specific use of treated wastewater as a drinking water source.

Indirect potable reuse occurs widely in the United States each time treated wastewater effluent is discharged to a natural waterway upstream of a water supply intake. In most cases, it is unintentional. Past experience indicates that indirect reuse was acceptable because the application of water and wastewater treatment techniques, the near-universal use of some form of disinfectant, and the natural dilution and purification that occurs in natural waterways adequately treated the water. However, in recent years the effectiveness of these measures in protection against viral and trace organic contaminants has come under increasing scrutiny. Unplanned and unintentional reuse of this type is classified as uncontrolled potable reuse, and represents the overwhelming majority of cases of indirect potable reuse.

Planned Program Elements

Potable Reuse. In 1992, the Hampton Roads Sanitation District (HRSD) suggested to Hampton Roads area communities the delivery of reclaimed water to supplement drinking water reservoir supplies. In response to HRSD's presentation of a reuse concept proposal, and resulting concerns expressed by water purveyors in southeastern Virginia, the Virginia Department of Health prepared a *Recycle Issues* paper dated November 24, 1992. The VDH stated its opposition to both direct and indirect potable reuse projects when naturally occurring sources of water are available. The VDH insists that the highest quality, best source of water be selected when alternatives are available. The VDH also listed several other requirements that would apply to a potable reuse project, pertaining to independent monitoring, dilution, and liability, removal of biological hazards and toxics, and utilization of natural purification processes. Given the current position of the VDH, reuse of wastewater treatment plant effluent for potable purposes is not deemed a practicable reuse alternative to conserve water.

Nonpotable Reuse. Many industrial water demands are for nonpotable uses. One method of reducing demands on potable water sources is to supply nonpotable demands using treated wastewater plant effluent. Detailed regulations for implementation of a water reuse project do not exist in the Commonwealth of Virginia. Permitting of a water reuse project would most likely involve both the VDH and the VDEQ. In addition, a Virginia Pollution Discharge Elimination System (VPDES) Permit would be required for discharge to state waters if the flow is not contaminated during its use; if it is contaminated, the approval of VDH and/or VDEQ would be required.

Several states, including California, Arizona, Texas, Utah and Florida, have developed regulations and statutes that specify the required minimum quality of reclaimed water, depending on the intended use of the water. In general, the requirements become more stringent as the likelihood of public contact increases. In California, if treated reclaimed water for industrial use meets the state's standards for full body contact recreation, workers are not required to avoid contact with the water or wear protective clothing. However, precautions are required should the treated reclaimed water fail to meet these criteria. With the approval of state and local health departments, reclaimed water can be used for soil compaction, dust control, and other construction purposes.

As mentioned previously, recycling will be required in all new car washes, and existing car washes will be required to be retrofitted. In addition, required recycling systems are being considered for all new construction and all repair or replacement of continuous flow devices, including any water connector, device, or appliance which requires a continuous flow of 5 gallons per minute or more.

Typically, nonpotable markets for reused water include irrigation uses, industrial uses, and creation of recreational lakes. Many factors affect the market for reused water, including:

- Size and location of demand.
- Water quality requirements.

- Degree of treatment required for discharge.
- Cost of reclaimed water.
- Cost and availability of alternative supplies.

It is likely that additional reuse methodologies will be evaluated in the future. Industries within the service area that use large quantities of water are continually evaluating their processes, and looking for ways to lower production costs. For these industries, water represents one of their greatest operating expenses. It is in the best interest of these industries to stay abreast of the latest reuse technologies, and employ them whenever feasible.

Future Program Elements

The Isle of Wight County Department of Utility Services will evaluate its water conservation programs on a continual basis. As part of this process, new water reuse technologies will be researched and evaluated to determine their applicability in the service area. Continued communication with large water users will create possibilities for more efficient use of water resources.

WATER USE RESTRICTIONS

Emergency Use Restriction Plan

Emergency situations, such as severe drought, may threaten the regional water supply. During these times, the implementation of use restrictions is necessary to protect the water supply from further depletion. Use restrictions are considered a form of conservation because they result in demand reductions, but they are implemented only during periods when the regional water supply is threatened. Such restrictions are reserved as contingency measures for emergency situations, and are more restrictive than normal conservation measures that are used continually to reduce demands. Use restrictions are commonly implemented using a tiered approach, and are activated in relation to specific storage levels of a system's raw water supply.

Isle of Wight County has developed a four-tiered use restriction plan. **Article VIII of Section 16.1** in the Isle of Wight County Code presents the procedures used in detail (see Appendix to this section). When the Board of Supervisors finds that the immediate potential for a water shortage exists, the Director of Utility Services is authorized to implement conservation measures. The four tiers of use restrictions are as follows:

- Tier 1 – Voluntary Use Restrictions: Voluntary Use Restrictions are employed as a first stage in reducing water demands during a potential water shortage. These restrictions are encouraged by the water utility, but compliance is not required. When Tier 1 is in effect, the public will be asked to employ restraint in water usage, and to conserve water voluntarily by whatever methods are available.

- Tier 2 – Mandatory Use Restrictions: Mandatory Use Restrictions are put into effect when very limited supplies of water are available. These restrictions focus on the elimination of outdoor, nonessential uses of water. In Tier 2, compliance is mandated by a local ordinance, and the restrictions are enforced with penalties for violations.
- Tier 3 – Mandatory Reductions: Mandatory reductions in water use will be used to further reduce water usage under the most severe drought conditions. Non-residential users will be allotted a percentage reduction based on their average monthly and/or previous bimonthly consumption. Residential customers will be limited to a specific volume or percentage reduction of water per quarter. A surcharge of 10 dollars for every 100 cubic feet of water consumed above the allotted volume will be applied.
- Tier 4 – Water Rationing: When only crucial supplies of water are available, the Director of Utility Services or the Director of DEQ will restrict water use to the purposes that are essential to life, health and safety.

These restrictions will be implemented, and other restrictions may also be implemented whenever requirements for mandatory water use restrictions during water shortage emergencies are declared by the Director of the Department of Environmental Quality (DEQ).

When determining the level of use restriction to be implemented, the Director of Utility Services should consider water levels, available storage, drawdown rates, projected supply capability, system purification and pumping capacity, daily and projected water consumption, prevailing and forecasted weather conditions, fire service requirements, pipeline conditions, supplementary source data, estimates of minimum essential supplies to preserve public health and safety, and other pertinent data. The restrictions do not apply to any governmental activity, institution, business, or industry which is declared by the Director of Utility Services to be necessary for public health, safety and welfare, or on which the restrictions would place severe economic hardship or cause substantial loss of employment.

Enforcement

No enforcement or penalties are involved with Tier 1 because compliance with this tier is strictly voluntary. A violation of Tiers 2, 3 or 4 will result in a fine not to exceed five hundred dollars, in addition to any additional charges that apply to the violation. Each day of a continued violation will be considered a separate offense. In addition, the Director of Utility Services can suspend water service to any person violating the use restrictions. If water service is terminated, a reconnection fee of fifty dollars plus all outstanding fees and fines must be paid before service is restored.

SUMMARY OF CONSERVATION PLAN

The Isle of Wight Water Conservation Management Plan will aid the County in meeting its water supply needs over the next decade. The Plan includes a variety of elements to be implemented on a regular basis. Water saving plumbing, as described in the USBC, will be required. Economic incentives will encourage conservation. Annual water loss audits and a leak reduction program will reduce water loss. An education program will help the public to understand the importance of conservation and methods by which conservation can be achieved. Evaluation of the potential for reuse of treated wastewater, especially for industry, will be completed for all new facilities. In addition, a four-tiered approach to reducing water consumption during emergency conditions will protect the County's water supplies.

A combination of the water conservation measures to be implemented under normal conditions and the emergency use restrictions described in this document will reduce finished water demand. Through a combination of new supply sources and water conservation, the County will be able to supply predicted water demands into the future.

**WATER CONSERVATION AND MANAGEMENT PLAN
DEPARTMENT OF UTILITY SERVICES
APPENDIX**

ARTICLE VIII. EMERGENCY PROCEDURES DURING WATER SHORTAGES

Sec. 16.1.36. Purpose.

During the continued existence of climatic, hydrological and other extraordinary conditions, the protection of the health, safety and welfare of the residents of the County of Isle of Wight and the other customers served by the County water system may require that certain uses of water, nonessential to public health, safety and welfare, be reduced, restricted or curtailed; and as the shortage of potable water may become increasingly more critical, conservation measures to further reduce consumption or curtail essential water use may be required.

Sec. 16.1.37. Procedures.

- (a) The Board of Supervisors finds that when there exists an immediate potential for a shortage of potable water in the County of Isle of Wight's water system, increasingly more restrictive conservation measures may be required to prevent a crucial water shortage;
- (b) The Director of Utility Services is hereby directed to implement conservation measures at such times by ordering the restricted use of absolute curtailment of the use of water for certain nonessential purposes for the duration of the water shortage in the manner hereinafter set out. In exercising his discretionary authority and making the determinations set forth herein, the Director of Utility Services shall give due consideration to water levels; available/usable storage on hand; drawdown rates; the projected supply capability in water sources available to the system; system purification and pumping capacity; daily water consumption and consumption projections of the system's customers; prevailing and forecasted weather conditions; fire service requirements; pipeline conditions including breakage, stoppages and leaks; supplementary source data; estimates of minimum essential supplies to preserve public health and safety; and such other data pertinent to the past, current and projected water demands;
- (c) The provisions of this article, or regulations promulgated hereunder by the Director of Utility Services which are hereby authorized, shall not apply to any governmental activity, institution, business or industry which shall be declared by the Director of Utility Services, upon a proper showing, to be necessary for the public health, safety and welfare, or the prevention of severe economic hardship or the substantial loss of employment;
- (d) Upon a determination by the Director of Utility Services of the existence of the following conditions, the Director of Utility Services shall take the following actions:
 - (1) *Condition I:* When moderate but limited supplies of water are available, the Director of Utility Services shall, through appropriate means, call upon the general population to employ prudent restraint in water usage, and to conserve water voluntarily by whatever methods available.

- (2) *Condition 2:* When very limited supplies of water are available, the Director of Utility Services shall order curtailment of less essential usage of water, including, but not limited to, one or more of the following:
- a. The watering of shrubbery, trees, lawns, grass, plants or any other vegetation, except indoor plantings, greenhouse or nursery stocks, and except watering by commercial nurseries of freshly planted plants upon planting and once a week for five (5) weeks following planting;
 - b. The washing of automobiles, trucks, trailers, boats, airplanes, or any other type of mobile equipment, excepting in facilities operating with a water recycling system approved by the Director of the County provided, however, that any facility operating with a water recycling system shall permanently display in public view a notice approved by the Director of Utility Services stating that such recycling system is in operation. In lieu of the provisions hereof, the Department of Utility Services may curtail the hours of operation of commercial enterprises offering such services in washing their own equipment;
 - c. The washing of streets, driveways, parking lots, service station aprons, office buildings, exteriors of homes or apartments, or other outdoor surfaces;
 - d. The operation of any ornamental fountain or other structure requiring a similar use of water;
 - e. The filling of swimming and/or wading pools, or the refilling of swimming and/or wading pools that were drained after the effective date of the Director of Utility Services' order;
 - f. The use of water from fire hydrants for any purpose other than fire suppression or other public emergency.
- (3) *Condition 3:* When critically limited supplies of water are available, the Director of Utility Services shall institute mandatory reductions to each customer as follows:
- a. Industrial, institutional, commercial, governmental, wholesale, and all other non-residential customers shall be allotted a percentage reduction based on their average monthly and/or previous bimonthly consumption;
 - b. Individual residential customers shall be limited to a specific volume or percentage reduction of water per quarter;
 - c. If the allotted monthly and/or bimonthly water usage is exceeded, the customer shall be charged ten dollars (\$10.00) for every one hundred (100) cubic feet of water consumed above the allotted volume. Where prior consumption data is not available, the Director of Utility Services shall estimate allocations based on the data available from similar activities of equal intensity.
- (4) *Condition 4:* When only crucial supplies of water are available, the Director of Utility Services shall restrict the use of water to purposes which are absolutely essential to life, health and safety.

Sec. 16.1.38 Written report required.

The determination of Conditions 2, 3, and 4 by the Director of Utility Services shall be accompanied by a written report, which shall set out criteria utilized and data relied upon in making such determination including a narrative summary supporting the determination. Each report shall be promptly filed with the Count clerk, who shall make the same available for public inspection. The Director of Utility Services shall forthwith transmit a copy of each report to the Board of Supervisors.

Sec. 16.1.39 Penalties for noncompliance.

- (a) Any person who shall violate any provision of this article, or any of the conservation regulations promulgated by the Director of Utility Services pursuant thereto, shall, upon conviction thereof, in addition to additional charges and/or other actions set forth herein, be fined not more than five hundred dollars (\$500.00). Each act, or each day's continuation of a violation, shall be considered a separate offense;
- (b) In addition to the foregoing, the Director of Utility Services may suspend water service to any person violating the provisions of this article or the regulations promulgated hereunder. If such water service is terminated, the person shall pay a reconnection fee of fifty dollars (\$50.00) plus all outstanding fines and fees before service will be restored.

Sec. 16.1.40. Notice of cessation of emergency.

The Director of Utility Services shall notify the Board of Supervisors when the resource shortage is over and the emergency situation no longer exists.